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WT-45

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OPERATION GREENHOUSE

COMMUNICATIONS

DTIC QUALITY INSPECTED 5

TECHNICAL REPORT

DISTRIBUTION STATEMENT A APPLIES
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Defense Nuclear Agency
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29 June 1995

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SUBJECT: Inclusion of WT-45 into the DTIC System

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FOR THE DIRECTOR

JOSEPHINE B. WOOD
Chief, Technical Support

Enclosure
As Stated

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TECHNICAL REPORT

COMMUNICATIONS

OPERATION GREENHOUSE

1951

COMMANDED BY LT. GEN. ELWOOD R. QUESADA

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PREFACE

The purpose of this report is to present a comprehensive summation of Joint Task Force THREE communications for Operation GREENHOUSE to include technical information and operational experience not desirable for inclusion in the historical account of the Operation. The information is of vital interest to Communications Officers for subsequent operations at the Atomic Energy Proving Ground, Eniwetok Atoll, as well as to communications personnel of all services for possible application to their regular task or the provision of communications for similar Joint Task Force Operations.

It is believed that future task forces conducting operations at Eniwetok will probably be organized similarly to JTF–3 and, therefore, it is quite probable that the communications for succeeding task forces will be similar to those of JTF–3. For Operation GREENHOUSE there was an extensive investment in fixed communications plant; this plant remains as the communications system of the Eniwetok Atomic Weapons Proving Ground. All nonperishable and noncritical equipment used in connection with Operation GREENHOUSE remains at Eniwetok for use in subsequent operations.

The communications officers of any succeeding task force and the communications officers of succeeding task groups should be interested in the problems presented in the preliminary planning, organization, and engineering for Operation GREENHOUSE, since the solution of these problems is exemplified by the plant and equipment in place and at hand at Eniwetok. The details of these processes are of further value because from a familiarity with them, one can understand the reason behind certain of the recommendations that stem therefrom.

Details of operation, such as call sign, frequency, and circuit assignments; net organization; traffic loads; security measures; etc., reveal the capabilities of the plant and offer a basis for understanding the recommendations as to operation.

The sections on supply and maintenance, roll-up, and interim operations are of particular value for the lessons one can learn as to the supply problems of Operation GREENHOUSE and their solution, and for the information they convey as to the equipment on hand at Eniwetok and the measures taken to preserve it in storage, and finally for the information as to the facilities remaining in operation at the Eniwetok Atoll.

All of the matter presented in the body of the report culminates in conclusions derived from this matter and in recommendations for changes in plant, equipment, and for future operations. The appendices provide supporting data for material in the body of the report, to which they are referred.

This report is designed to be a handbook for Joint Task Force communications officers and a reference book for task group communications officers serving the Eniwetok Atomic Weapons Proving Ground. Where, in this report, reference is made in conclusions and recommendations to JTF–3 and its component organizations, the matter is intended to apply to succeeding corresponding organizations.

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ACKNOWLEDGEMENTS

Communications for Operation GREENHOUSE enjoyed the complete support of all services. The organizations, not a part of JTF–3 which contributed directly to the communications mission of the operation are listed below, with particular reference to their principal contribution. In certain instances, additional support, not specifically mentioned, was afforded by many of the organizations and individuals mentioned. The efforts of all contributed to the successful accomplishment of the communications mission of Operation GREENHOUSE.

ASSISTING ORGANIZATIONS

Among the many organizations, external to the Task Force, contributing to the success of communications for Operation GREENHOUSE were:

Joint Communications and Electronic Committee of the Joint Chiefs of Staff: Assignment of frequencies, call signs, routing indicators, and delivery groups.

The Chief Signal Officer and his subordinate agencies: Furnished communications personnel to the Army Task Group for installation, operation, and maintenance of all Headquarters, JTF–3 and TG 3.2 communications, and for the installation and maintenance of communications equipment used by TG 3.1; furnished all communications equipment for Hq, JTF–3 and TG 3.2, and some equipment for TG 3.1 and TG 3.3; furnished technical assistance and advice for planning purposes.

The Office of the Director of Communications, USAF, and its Agencies: The provision of communications equipment and personnel for the Air Task Group.

The Office of the Chief of Naval Operations: Modifications of the AV–4 (USS CURTISS) and the transport (SGT. MOWER) necessary to provide the desired shipboard communications; the supply of communications personnel and equipment for the Naval Task Group.

BUSHIPS—Assistance to TG 3.3 in the installation of equipment aboard the USS CURTISS and the SGT. MOWER; assistance to the Electronics Section in the early planning stages for naval communications for JTF–3.

Hqs, USCG, Washington, D. C.—The provision of LORAN facilities required by JTF–3.

Director Naval Communications—Technical assistance in the installation of special electronic equipment aboard TG 3.3 vessels.

Communications Division, AEC, Washington, D. C.—Supply of cryptographic material.

The Signal Corps Engineering Laboratories—Furnished special electronic equipment not available from normal supply sources.

Airways and Air Communications Service—The engineering, installation, and operation of communications and navigational aids necessary for air weather collection and dissemination, scheduled type transport aircraft and airport control as required for all types of aircraft involved.

Navy Hydrographic Office—The preparation and supply of special charts.

Army Security Agency, Washington, D. C.—Furnished technical assistance with respect to the communications security program; furnished cryptographic technicians to TG 3.2. This personnel was not available through normal channels.

Armed Forces Security Agency, Washington, D. C.—Furnished technical assistance with respect to the communications security program.

Air Force Security Service—Furnished technical assistance with respect to the communications security program.

U. S. Navy Communications Security Activity, Hawaii—Furnished technical assistance

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with respect to the communications security program.

Army Security Agency, Hawaii—Assistance in the installation of cryptographic facilities; supply of cryptographic devices and documents, and Security Monitoring Service.

The Signal Officer, USARPAC—Furnished installation teams to assist with the installation of TG 3.2 communications equipment; the USARPAC Garrison Signal Detachment assisted TG 3.2 in the operation of communications facilities during the construction phase of Operation GREENHOUSE; furnished some construction materials and filled numerous requisitions for supplies and maintenance parts.

Communications Officer, Hq, 6th Army—Receipt and delivery of Hq, JTF-3 traffic in the West Coast Area.

SFNY Inst. of Communications Equipment on USS CURTISS.

AMC—For the coordinated procurement and supply of numerous items of communications equipment used in Operation GREENHOUSE.

SMAMA—For the supply and processing of Air Force communications equipment.

ADC—For the loan of special radar equipment and the key operating personnel.

Watson Air Force Laboratories—For the development and supply of special radar and control communications equipment.

CINCPAC—Coordination of frequencies required for use by JTF-3; certain tactical communications channels.

Commander, 14th Coast Guard District—Provision of LORAN facilities including the installation of a new station on Eniwetok.

Sacramento Signal Depot—Normal logistic support; technical advice and the loan of supervisory personnel to accomplish roll-up of communications facilities upon completion of Operation GREENHOUSE.

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Chapter I

PRELIMINARY PLANNING

1.1 The Joint Proof Test Committee was an agency established in the summer of 1949 by the Joint Chiefs of Staff to organize and formulate preliminary plans for the Task Force to conduct atomic weapons tests at Eniwetok Atoll in 1951. Lt. Gen. Elwood R. Quesada was assigned as Chairman, representing the Executive Agency, U. S. Air Force. In the early fall of 1949 this organization was given the cover title of Joint Technical Planning Committee; and in November of that year, the official title of Joint Task Force THREE was assigned and the weapons tests were given the title Operation GREENHOUSE, both being classified until December 1949.

1.2 In July of 1949, Colonel Leland H. Stanford, then assigned to duty in the Office of Secretary of Defense, was nominated by the Chief Signal Officer for assignment to the Joint Proof Test Committee, in addition to his other duties. At the same time, the services of Mr. Jack Eggert, an engineer from the Signal Corps Engineering Laboratories, were made available as a technical consultant. Colonel Stanford was also advised that when required, he could have the services of Lt. Col. Earle F. Cook, Deputy to the Signal Officer, USARPAC.

1.3 In October 1949 Col. Stanford was assigned to the Joint Technical Planning Committee, as Army Member, as his principal duty. From July to October 1949 he served as Chairman, Communications Panel. The other members of the Panel were: Captain Christian L. Engleman for the Navy, Lt. Col. C. J. Lester for the Air Force, and Dr. J. C. Clark for the Los Alamos Scientific Laboratories.

1.4 At the time of Col. Stanford's initial assignment to the Committee, it was found that the Atomic Energy Commission had placed responsibility for the Eniwetok tests with the University of California which was represented at Los Alamos by the J-Division, and had contracted with Holmes and Narver, an engineering firm in Los Angeles, for engineering, installation, and operation of facilities at Eniwetok Atoll. This firm had made two extensive reconnaissances at Eniwetok for preparatory planning. The results of these visits and the preliminary plans based thereon are contained in bound volumes of Holmes and Narver reports which proved to be of great value in communications planning.

1.5 Operation GREENHOUSE was to be a responsibility of JTF–3, the headquarters of which had the responsibility of overall planning and coordination. The scientific tests were to be conducted by Task Group 3.1 organized from personnel of the Los Alamos Scientific Laboratories. Logistical support was to be provided by the Army Task Group, TG 3.2, and naval support was to be afforded by the Navy Task Group, TG 3.3. Air Force support, both administratively and operationally, was to be a function of the Air Force Task Group, TG 3.4. Hq, JTF–3 and Hq, TG 3.1 were to be on Parry Island and the headquarters of TG 3.2 and TG 3.4 were to be on Eniwetok Island, while the headquarters of TG 3.3 was to be afloat. The major mission of the services was to contribute the support which would enable the scientific task group to accomplish the scientific tests outlined for Operation GREENHOUSE and to support the Atomic Energy Commission in the construction and development of the semi-permanent proving ground to be used for Operation GREENHOUSE and for subsequent operations.

1.6 With respect to communications, H&N had the responsibility for procuring and laying the inter-island cables and local telephone plant cables, and procuring and installing

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telephone switchboards and telephone instruments. In addition, the contractor was to operate and maintain the above communications facilities when installed, and to provide a radio back-up to the inter-island and buoy cables.

1.7 The first atomic weapon tests, Operation CROSSROADS, had been held at Bikini and had been primarily ship-based; hence it could afford little information of value in preparing for communications for Operation GREENHOUSE. The second atomic weapons tests, Operation SANDSTONE, had been held at Eniwetok in 1948 and had been ship-based for command, but had had considerable communications plant ashore. The extensive report of communications for Operation SANDSTONE contained considerable information of value in planning for Operation GREENHOUSE; but because of the wide differences in plans and arrangements between the two operations, the report could serve only as a general guide.

1.8 In reconnaissance at Eniwetok Atoll, it was learned that Eniwetok Atoll, one of the Marshall Islands Group (Figure 1), is located substantially at 11°, 30 minutes north latitude and 162°, 20 minutes east longitude. This location is of particular interest in view of the time differences involved. The islands of the Atoll are arranged roughly in the shape of a circle, having a diameter of about 20 miles. Most of the islands are on the eastern half of the circle (Figure 2). Entrance to the lagoon, embraced by the islands, is through the wide passage, to the south of the lagoon, and through the deep passage, to the southeast of the lagoon. The two principal islands for command purposes of Operation GREENHOUSE were Parry and Eniwetok Islands, lying in that order, south of the deep passage, separated from each other by about two miles of reef. The other islands of the Atoll, extending north of the deep passage and interconnected by coral reef, are Japtan, Runit, Rojoa-Biijiri-Aomon-Eberiru, and Engebi Islands, in that order, with other smaller and less important islands intervening and beyond. Because of its position in the low latitudes, Eniwetok has a tropical climate of marine type. The temperature is high and remarkably uniform, deviating no more than 1° in any month from the annual mean of 81° Fahrenheit. The diurnal variation is also slight; the highest temperature is usually registered between 1300 and 1400 hours, and normally exceeds the lowest temperature, registered between 0500 and 0600 hours, by only 10° or 12°. Humidity in the atoll is very high, and shows extremely little seasonal variation. Relative humidity varies somewhat during the day, however, being highest ordinarily about 0600, and lowest about 1400 hours. The mean relative humidity throughout the year is about 85%. At ground surface and extending upward for about 30 feet, the air is filled with airborne salt water spray which is highly corrosive to metals such as zinc and iron. The tropical heat of the atoll is moderated by strong cooling sea breezes. The northeast tradewinds are dependable and usually bring excellent weather. Wind blows the strongest at the height of northeast trades, but during the summer decreases appreciably in intensity and often yields to temporary periods of calm. In an average day the wind is strongest at about 0600 and most moderate in the early evening. These conditions make it necessary to maintain a constant program to combat rust, corrosion, and mildew. The soil of the islands and the reef are essentially hard coral with little, if any, top soil. There is a small amount of loose coral sand to be found in pockets in the coral rock. For these reasons, digging and dredging is rather difficult and once an excavation is back-filled, it is usual for the coral to re-cement itself into a rock-like formation. The coral rock is extremely porous and retains little, if any, surface water. This means that for communication work, the soil affords practically no ground, and ground must be achieved by excavating down to water level. There is extremely little vegetation upon Eniwetok and Parry Islands; that on Eniwetok Island consists of a few isolated palm trees with a very thin scattering of tropical shrubbery, while that on Parry Island consists of a limited amount of tropical shrubbery on the southern part of the island with a very light scattering of coconut palms.

[redacted]

Distances
(In Nautical Miles)

San Francisco	—	Hawaii	2090
Johnson	—	Kwajalein	1415
Eniwetok	—	Guam	1066
Hawaii	—	Johnson	715
Hawaii	—	Tokyo	3394
Kwajalein	—	Eniwetok	330
Eniwetok	—	Truk	670
Eniwetok	—	Wake	530
San Francisco	—	Eniwetok	4400

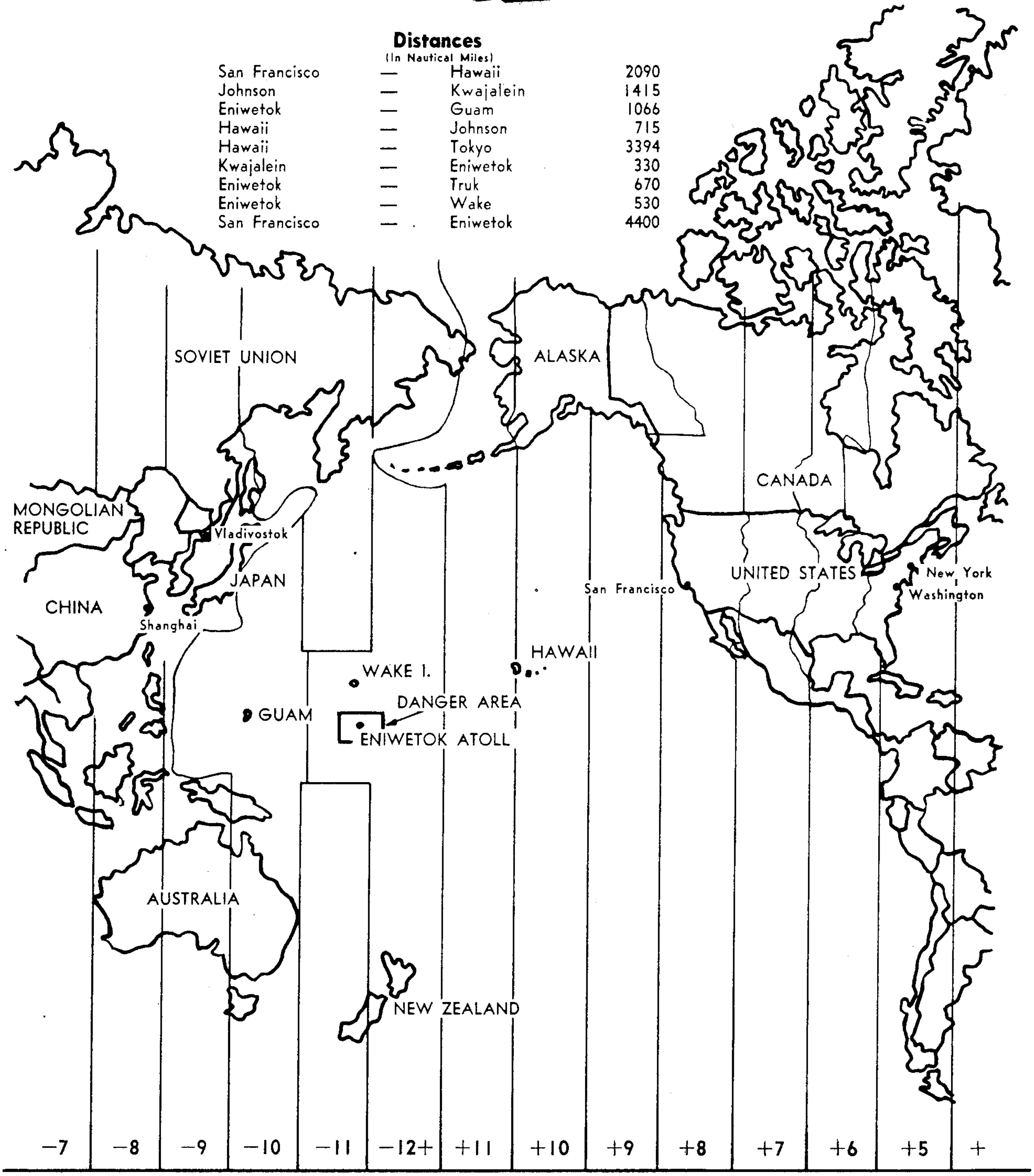

FIGURE 1. Time and Distance Chart, Pacific Area

1.9 The initial problems of the Chairman of the Communications Panel were:

(1) To recommend the mission of the Task Force Communications Officer.

(2) To formulate general plans for Hq, JTF–3 communications.

(3) To determine the general communications plans of each of the services, and to determine their relation to Hq, JTF–3 plans.

(4) To determine the space requirements for housing the facilities for the forego-

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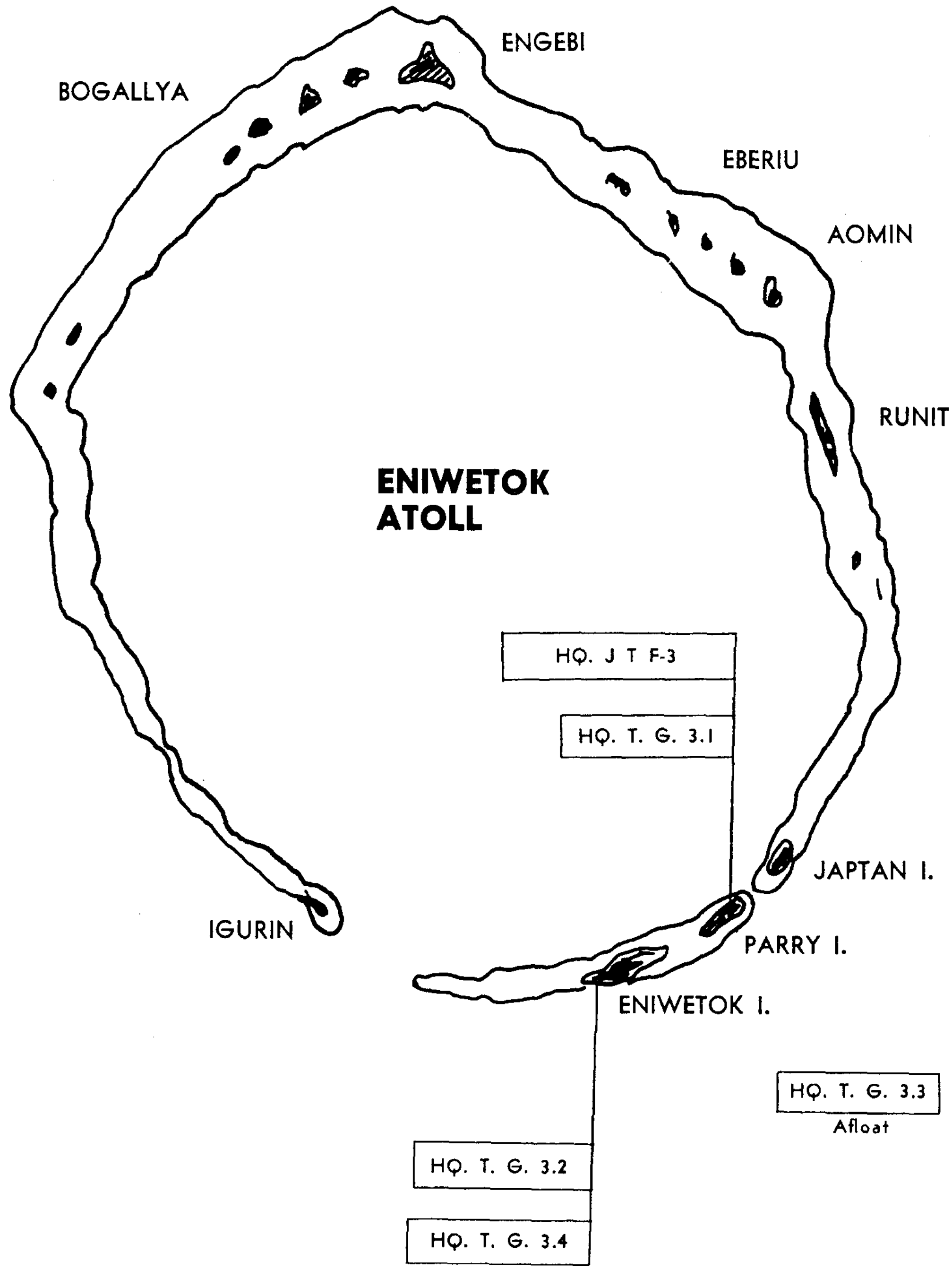

FIGURE 2. Eniwetok Atoll Showing Location of JTF–3 Units

ing communications, and to arrange for the inclusion of the necessary housing in the building program.

(5) To determine personnel requirements for operating the above communications, and to arrange for accommodations for the personnel to be included in the building program.

1.10 The missions recommended for the Joint Task Force Communications Officer by the Communications Panel and approved by Lt. General Quesada in November 1949 were:

(1) Preparation of the Communications Annex to the Field Order.

(2) Control and assignment of all radio frequencies.

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(3) Control and assignment of all full-time wire circuits.
(4) Liaison with Task Group Headquarters and final approval of their communications plans.
(5) Planning communications to the Zone of the Interior.
(6) Planning for inter-island communications in the event of failure or inadequacy of the contractor's system.
(7) Planning communications essential to the establishment of an auxiliary command post.
(8) Establish levels of supply of communications equipment.

Subsequently, in January 1950 when the construction and the operation of the plant at Eniwetok Island was transferred from the responsibility of Holmes and Narver to that of the Army Task Group, the supervision of the installation and operation of the Eniwetok Island telephone system became a further responsibility of the Communications Officer, Hq, JTF–3.

1.11 The Communications Panel established that the general communications plan of Hq, JTF–3, in extension of the assigned missions, would include a communications center on Parry Island with radio teletype to Hq, USARPAC communications center in Honolulu for contact with the Army Command and Administrative Network, and a radio teletype circuit to Los Alamos. This latter circuit was provided at the specific request of Dr. Clark, with a view to expediting traffic between Eniwetok and Los Alamos, said to have been excessively delayed during Operation SANDSTONE. Internally, the Hq, JTF–3 communications center was planned to serve Hq, TG 3.1 by messenger; TG 3.2 and TG 3.4 by teletype over inter-island submarine cables, with VHF radio (AN/TRC) as a back-up; and TG 3.3 by teletype over inter-island and buoy submarine cables, with VHF radio (AN/TRC) as a back-up. Normal person-to-person communication was to be provided by telephone exchange circuits. All inter-island, exchange, and buoy cables were to be considered secure for matter in the clear, up to and including SECRET; but all radio in the clear was to be limited to unclassified traffic. It was agreed by the Los Alamos Scientific Laboratory that TG 3.1, when organized, would utilize radio equipment furnished on loan by the Signal Corps rather than purchase communication radio components, and that TG 3.1 would rely upon JTF–3 for provision for back-up to the inter-island cables. It had been initially planned by Los Alamos to provide VHF point-to-point single-channel voice radio for this service without connection to the telephone exchange system. The Chairman of the Communications Panel advocated an AN/TRC link with one station fixed and one mobile with inter-connection to the local telephone exchange, in lieu of the proposed service.

1.12 The general plans for communications within TG 3.1 and TG 3.3 were left to the units themselves, to be completed upon activation, since it was anticipated that none of the facilities afforded within these units would affect Hq, JTF–3 communications plans. The Navy Panel Member stated that there was no foreseen requirement for any shore-based communications element of TG 3.3. A general plan for communications for TG 3.4, based upon Operation SANDSTONE was prepared and submitted by the Air Force Panel Member, after consultation with Hq, AACS, Andrews Field. This plan was later somewhat modified by Col. C. A. Thorpe while serving with JTF–3 prior to his assignment as Communications Officer, TG 3.4. The general communications plan for TG 3.2 was prepared by the Army Panel Member and was based upon the inter-relations between Hq, JTF–3 and Hq, TG 3.2. These general plans were later considerably modified and extended after the various task groups were organized.

1.13 The next problem confronting the Communication Panel of the Joint Proof Test Committee was the provision of housing for communications facilities. This could only follow the formulation of basic communication plans involving housing. The contractor had evolved a standard building design with a width of 24 ft. available in modules of 4 ft. These double-roofed aluminum buildings could have a variety of wall panels, such as solid, lower and upper hinged panels, upper hinged panel only, and door. The floor was to be coral-concrete aggregate with smooth

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cement topping. The buildings were to have an expected life of about 20 years.

1.14 After the visit to Eniwetok in November 1949, the Chairman of the Communications Panel decided that the only building used by previous communications facilities worthy of retention was the Butler Building (#83), as a warehouse, and one Quonset just south of building #83 was retained temporarily for storage of unused components and in-use bin stock. All other Quonsets previously used for communications were in extremely bad condition with very little future life. At the same time, it was found that the poles in the Joint Transmitter Antenna Farm and in the Task Force Receiving Antenna Farm were in fairly good condition. It was therefore decided to retain for similar purposes the areas of these antenna farms.

1.15 From a study of the communications plans, it was decided that TG 3.1 and TG 3.3 required no special facilities; and that the requirements of TG 3.2 could be met with slight augmentation of the Joint Task Force needs. It was also decided that except for the higher powered radio transmitters, all communications facilities of TG 3.4 would be in the area of that task group, mid-way and to the east of the run-way.

1.16 It was proposed by the Communications Panel that the Joint Transmitter Building on Eniwetok should be 120 ft. long. Efforts were made by the Los Alamos Scientific Laboratory to reduce this to 64 ft. After considerable argument, compromise was reached on 88 ft. of length; and in the resulting building, there was considerable crowding and no room for future expansion without building modification. The Transmitter Building was sited on the lagoon side of the island to avoid the spray from the breakers on the reef. The Power Building, associated with the Transmitter Building, was designed for two PE-215's, the output of which would operate only the most essential facilities. By re-arrangement within the building, it was proposed to install a third PE-215 to carry the full load, but when an F-3 generator, instead of a PE-215 was furnished by TG 3.4 for this purpose, it had to be set up in the open, adjacent to the Power Building. In the transmitting antenna farm the Joint Task Force antennas were allocated space in the northern part of the area, and those of AACS in the southern part. The antenna farm area originally planned was considerably reduced to make room for the Loran antennas at the extreme northern end of the island.

1.17 The Radio Receiving Building on Eniwetok was designed to house JTF-3 receivers, the crystal grinding plant, and the monitoring facility. It was constructed substantially as originally designed. It was located just to the south of the warehouse, with a view to being conveniently located to the existing receiving rhombic antennas, which were used with only minor modifications. Associated with the Radio Receiver Building, and in a separate aluminum structure, was an emergency power plant designed as a source of emergency power for the receiver building and the warehouse, and as a battery charging plant.

1.18 The space for the Eniwetok telephone exchange, TG 3.2 communications center, and cryptographic facilities was designed for inclusion in one wing of the Headquarters Building (#15). The contractor proposed to cut the code room space to 8 ft. wide, but by compromise, it was subsequently arranged that this be increased to 12 ft. wide. Original plans included forced-draft ventilation for the code room.

1.19 Task Group 3.4 facilities on Eniwetok were planned for buildings 89 and 90; and were to include space for AACS communications, weather, and cryptography. The space planned for provision for the AACS communications was cut prohibitively in review at Los Alamos; but at the last minute an increase in net space for these communications was achieved by dispensing with the code room which was planned for inclusion within the area. This was made possible by the decision to have TG 3.2 accomplish cryptography for TG 3.4, since the local cable pairs being authorized for transmissions up to and including secret, in the clear, and the anticipated normal cryptographic load of TG 3.2 being light. The fact that AACS could not obtain cryptographers (MOS 805), and that AACS sorely needed the space made the elimi-

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nation of the TG 3.4 code room necessary. The space provided for other TG 3.4 communications facilities was adequate, except that in planning, no initial provision was made for emergency power. It was visualized that this power would be necessary only for the communications facilities and it was estimated that it could be provided by a power plant in the base of the control tower. However, when the power requirements for communications of TG 3.4 were found to include several radar equipments, GCI station, and the air strip lighting system, it became necessary to provide an emergency power plant in a separate building. The TG 3.4 Antenna Farm area was restricted in size, and this caused the elimination of plans for use of full rhombic antennas; and the proximity of the runway caused the height of the antenna poles to be limited to 40 ft., which was an extension of the limit of 25 ft. originally imposed.

1.20 Plans were made to reinforce local underground telephone cable plant on Eniwetok, which was in good condition. This involved the laying of a few additional local cables, chiefly in the central portion of the island. Facility was planned for cross-connecting between cables to afford emergency relief in event of congestion or cable damage.

1.21 Preliminary plans for Eniwetok also included arrangements for the installation of an Armed Forces Radio Broadcast Station, and the reception of press dispatches for the local Garrison.

1.22 On Parry Island the Hq, JTF-3 communications facilities were planned for installation in the Joint Task Force Hq, Building (#222) and included the communications center, the code vault, and the office of the Task Force Communications Officer. As a part of the previously mentioned compromise, the code room as planned was increased in size and a resulting increase of 8 ft. in the building frontage was made. No provision was made in preliminary plans for housing the emergency power plant; however, subsequently a shed was erected over this equipment. Provision for the Communications Security Section was not included because no information was available at the time as to its composition or size; and at the time of planning, this service was a responsibility of the J-2 Division.

1.23 In the matter of personnel planning, it was proposed that the personnel requirements for JTF-3 communications and those of TG 3.2 be merged, and that each other task group make its own plans for personnel. The only background from Operation SANDSTONE available for communications personnel planning was that communications facilities of Task Force Hqs had been furnished by the communications personnel of the normal complement of the USS MT. MCKINLEY augmented by 171 Signal Corps enlisted men. Communications for Operation SANDSTONE differed so widely in basic plans from communications for Operation GREENHOUSE that little value was to be had from these data. It was decided early not to use 11-500 teams for JTF-3 communications personnel. From a review of the actual jobs, with only 10% for contingencies and reliefs, the figure of 150 EM for JTF-3 communications for Operation GREENHOUSE was derived. This was later cut to 146 EM by the elimination of a Mess Sgt. and 3 cooks, since all mess personnel, including Kitchen Police, was to be furnished by the Quartermaster. The initial figure of 146 was never revised in spite of increases in mission, because quartering and messing plans had been based upon this figure. The fact that 11-500 teams had not been used had some merit, but it also caused men with lesser qualifications within their MOS's to be assigned.

1.24 The personnel plans for TG 3.4 were included in the communications plan submitted by the Air Force Panel Member. These plans were later reviewed and considerably reduced by eliminating personnel provided for relief and emergencies.

Certain material relative to progress and build-up of the communications system, which is included in the Historical Report of Operation GREENHOUSE, has been omitted from this document, and for this reason, a detailed understanding of the entire program will require a study of the Communications Section of the History, as well as of this document. This report includes the charts and diagrams necessary for the proper record or re-use of installed facilities.

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Chapter II

ORGANIZATION

2.1 J-5 Division, Hq., JTF-3

2.1.1 Upon activation of Headquarters, JTF-3, on 1 November 1949, the Communications Section was established as an organic part of the J-3 (Plans and Operations) Division, which in effect made the Assistant Chief of Staff, J-3, responsible for the communications mission of the Task Force. As a result of a staff study prepared by Colonel Stanford for the Chief of Staff, Hq, JTF-3, in August of 1950, the Communications Section of the J-3 Division was established as a separate staff division (J-5) reporting directly to the Chief of Staff. This organizational change was approved in order to eliminate unnecessary briefing of staff personnel who were not technically qualified to render decisions on communications matters, and to afford a closer relationship between the Commander and the Communications Division, the problems of which were of major command concern and responsibility.

2.1.2 In view of the joint nature of the Task Force involving participation of the three services and a scientific task group, the Communications Division (J-5) was organized as shown in Figure 3, to include commissioned and enlisted assistants from each of the armed services. Assignment of personnel to the J-5 Division was effected over a period of several months as necessitated by the planning work load. Prior to June of 1950, the Communications Division consisted of the ACofS, J-5, and one commissioned assistant. The Division was not up to authorized strength until the Task Force became operational in the forward area in January of 1951.

2.1.3 The Frequency and Circuit Assignment Section was headed by the Air Force assistant to the ACofS, J-5. This officer handled details relative to liaison with Headquarters, USAF, the air task group, and with the Joint Communications and Electronics Committee (JCEC) in the procurement and assignment of frequencies and call signs for all elements of the Task Force. In the forward area, this officer's duties also included the planning and supervision of communications exercises prior to each scientific test to determine the extent of electronic interference to essential communications and electronic facilities.

2.1.4 The Army assistant was in charge of the Plans, Logistics, and Personnel Section, and served in the capacity of an Executive Officer prior to movement to the forward area. Communications personnel and supplies for Hq, JTF-3 and TG 3.2 and communications supplies for TG 3.1 were requisitioned by the J-5 Division, Hq, JTF-3. These duties, together with the administrative details of assembling communications plans, annexes to Field Orders, status and historical reports required the full-time duties of an officer. When the Task Force moved to the forward area, this officer was made responsible for installation, operation, and maintenance of special operational communications facilities and circuits required between the Hq, JTF-3 Command Post, Operations Center, and the operations centers and command posts of subordinate task groups.

2.1.5 The Traffic Operating Section was headed by the Navy assistant. This officer handled details relative to liaison with the Navy Department and Task Group 3.3, procurement and assignment of traffic routing indicators and address groups and together with the civilian technical consultant, supervised the installation of JTF-3 communications facilities aboard the USS CURTISS (TG 3.3 Command Ship). It was planned to

J-5 COMMUNICATIONS DIVISION

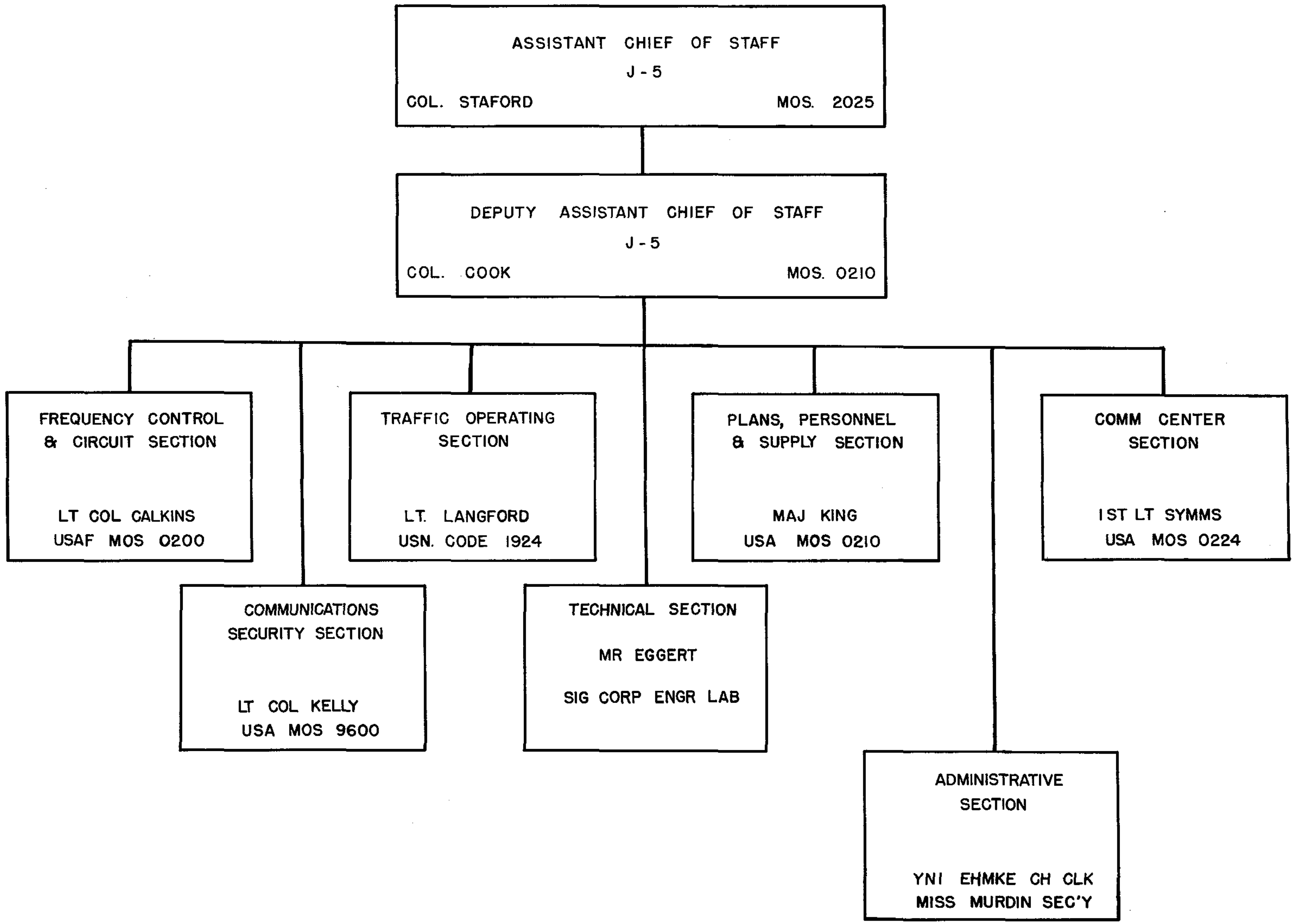

FIGURE 3. Organizational Chart, J–5 Division

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have this officer serve as Officer in Charge of the Hq, JTF–3 communications center when the Task Force moved to the forward area; however, he was evacuated due to illness shortly after arrival in the forward area and an officer of the 7127th AU Communications Detachment of TG 3.2 was given this responsibility.

2.1.6 The civilian technical consultant rendered valuable assistance and technical advice on site during the construction phase and, together with the Officer in Charge of the Frequency and Circuit Assignment Section, contributed substantially to the elimination of interference encountered between the innumerable electronic operational and control facilities during the operational phase of Operation GREENHOUSE.

2.1.7 The Communications Center Section of the J–5 Division was charged with the operation of a teletype communications center for Hq, JTF–3, in Temporary Building "U," Washington, D. C., as a tributary of the Department of the Army Communications Center.

2.1.8 The senior commissioned assistant (Air Force assistant) served as Deputy ACofS, J–5, prior to movement to the forward area. When the J–5 Division assumed operational control of Hq, JTF–3 communications in the forward area, minimizing the responsibilities of the Signal Officer of TG 3.2, that officer was transferred to Hq, JTF–3, for duty as Deputy ACofS, J–5. The ACofS, J–5, was required to be absent from Hq, JTF–3, for extended periods during Operation GREENHOUSE in connection with the construction program at Eniwetok, procurement and inspection of special electronic equipment from commercial sources and the coordination of communications plans of subordinate task groups.

2.1.9 It is recommended that a Deputy ACofS, J–5, be included in the organization of any subsequent Task Force. This officer would have the mission of communications operations officer in the forward area. It is also recommended that the J–5 Division include representation from the scientific task group in the assignment of an officer or civilian of officer equivalent rank.

2.1.10 Communications Security personnel assigned to JTF–3 by the three services were provided for a highly classified security program and not for a general security program. Originally this personnel, thirteen (13) in number (Figure 4), were assigned to the Intelligence Division (J–2). However, when J–5 was organized as a separate staff division, the Communications Security Section was transferred from J–2 to J–5. The chief reason for this was that the principal part of the special security program involved communications. Upon analysis, the Communications Security Section realized that the basic requirement for its special program rested primarily on secure communications. Consequently, 1 officer and 1 senior noncommissioned officer were given the main mission of general communications security. For the purpose of this report, only these two should be considered in communications security.

FIGURE 4

The following personnel, in the grades and services indicated, were assigned to JTF–3 for a Special Security Mission:

1.	LtCol	Army	MOS	9600
1.	Maj	USAF	AFSC	0200
1.	Capt	USAF	AFSC	0200
1.	Lt	USN	QUAL	1924
1.	Civilian	Army	......	......
1.	M/Sgt	USAF	AFSC	30112
1.	RMC	USN	NJC–RM	2301
1.	RM–1	USN	NJC–RM	2301
1.	TE–1	USN	NJC–RM	2201
1.	SFC	Army	MOS	1502
1.	SFC	Army	MOS	1805
1.	CPL	USAF	AFSC	20250
1.	PFC	Army	MOS	3070

2.1.11 The Administrative Section of the J–5 Division, Hq, JTF–3, was never up to authorized strength due to delay in obtaining "Q" clearances for assigned clerical personnel. For the Administrative Section a civilian stenographer, a chief clerk, and two (2) enlisted stenographers are considered a minimum for satisfactory operation of the Communications Division, exclusive of the Security Section and drafting service. A requirement for extensive drafting service existed in the Communications Section in the preparation of communications plans, circuit diagrams, equipment layout drawings, etc.; however, the Statistical Services Division of the headquar-

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ters should be augmented by one (1) full-time draftsman to meet Communications Division requirements.

2.2 Task Group 3.1 Communications Organization

2.2.1 The Communications mission of Task Group 3.1 included:

1. Coördinating the communications requirements of the scientific programs with Hq, JTF–3.
2. Installation, operation, and maintenance of the inter-island and buoy cable system and all telephone facilities except those required on Eniwetok Island.
3. Installation, operation, and maintenance of the ZI terminal of the Los Alamos-Eniwetok radio teletype circuit.
4. Editing and publishing the Atoll telephone directory.
5. Installation, operation, and maintenance of radio equipment required by scientific task units for communications service.
6. Furnishing voice, time, and warning signals for the Task Force.
7. Installation, operation, and maintenance of special electronic equipment required by TG 3.1.

2.2.2 The Communications Section of Task Group 3.1 in the forward area consisted of the Communications Officer, a Navy enlisted clerk and three (3) civilian radio technicians in the D–3, Plans and Operations Division of Hq, TG 3.1. Working with, but not a part of the Communications Section, was an AEC traffic analyst and an H&N repair section consisting of a supervisor and three (3) radio technicians. Holmes and Narver provided civilian employees for the operation and maintenance of the telephone system (including inter-island and buoy cables) on all islands other than Eniwetok. A cryptographic security officer was assigned to Hq, TG 3.1 Rear, Los Alamos, and four civilians were employed by the AEC for the operation of the radio station at Los Alamos.

2.2.3 The communications officer directed communications work through the H&N radio supervisor and issued the necessary work orders to accomplish radio installation and repair. Two of the radio technicians assigned to the Communications Section were detailed to work under the H&N radio supervisor. Their primary duties were to install and maintain radio communications on shot islands and to assist scientific groups with their communications over the critical period of shot minus two to shot plus two days. The third radio technician was responsible for special communications facilities required at the TG 3.1 operations control center. The cryptographic security officer was custodian of military cryptographic facilities used in conjunction with the AEC communications center at Los Alamos. The traffic analyst was concerned with instructions on message preparation and coordination with the Hq, JTF–3 communications center on traffic problems.

2.2.4 A disadvantage in the use of civilian employees by TG 3.1 was the turnover, particularly among telephone operators. Personnel were under no obligation to extend their initial twelve months' work contract and there was a constant turnover of operators during the operational phase of GREENHOUSE. In most cases personnel employed as telephone operators had no previous experience and had to be trained on the job.

2.2.5 The Communications Section of TG 3.1 was undermanned. Sufficient clerical help was not available for publication of telephone directories or for messenger service to the Hq, JTF–3 communications center and personnel had to be borrowed from other sections to perform these duties.

2.2.6 There was no individual or agency within the organization of TG 3.1 responsible for the entire communications mission of that group, for establishing operating procedures, or for the coordination of communications requirements for scientific contractors and programs directors. The H&N wire chief was responsible to the AEC resident engineer for telephone service; the H&N electrical engineer was responsible for submarine cable installation and maintenance; the communications officer was responsible for coordinating equipment requirements, for scientific and boat pool radio nets and for publication of telephone directories; and an H&N civilian employee was responsible for certain electronic maintenance within TG 3.1.

[redacted]

2.2.7 It is recommended that the TG 3.1 staff include a communications division responsible for the coordination of all internal communications requirements and for operational control of all scientific task group communications facilities. In the interest of economy and efficiency of operation, it is also recommended that the scientific task group be relieved of responsibility for the Atoll telephone and inter-island cable systems, and that their responsibilities be delegated to the Army Task Group. Holmes and Narver employed a total of eighteen (18) civilian telephone operators and approximately six (6) telephone installation and maintenance personnel. The Communications Detachment of the Army Task Group when reorganized will include replacements for this personnel.

2.3 Task Group 3.2 Communications Organization

2.3.1 The 7127th AU Communications Detachment (see organizational and functional charts, Figures 5 and 6) was organized as the signal unit of TG 3.2 to provide operating and maintenance personnel for Hq, JTF–3 and TG 3.2 communications. The Commanding Officer of the 7127th AU also served as Signal Officer, TG 3.2, a special staff officer on the staff of CTG 3.2.

2.3.2 The communications mission of the Army Task Group included:

1. Installation, operation, and maintenance of essential communications facilities for Hq, JTF–3, with the exception of telephone plant on islands other than Eniwetok Island, and the inter-island and buoy cable system. (During the period that Hq, JTF–3, was operational in the forward area, the JTF–3 Comm Center Section and the Radio Section of the 7127th AU Communications Detachment was under the operational control of the J–5 Division, Hq, JTF–3.)
2. Internal TG 3.2 communications including guard and boat pool radio nets.
3. Telephone and cryptographic service for TG 3.2, TG 3.4, and all other agencies stationed on Eniwetok Island.

2.3.3 The communications mission embraced the following function:

1. Installation, operation, and maintenance of:
   a. The telephone system on Eniwetok.
   b. Administrative radio facilities.
   c. Communications Centers on Parry and Eniwetok Islands.
   d. Back-up power equipment for communications facilities.
   e. Telephone and telegraph carrier equipment in conjunction with radio terminal sets (AN/TRC–3) as back-up facility for telephone and radio keying circuits between Parry and Eniwetok Islands.
   f. Boat pool radio installation and maintenance.
   g. A battery charging plant for maintenance of storage batteries used in portable radio sets and back-up power plants.
   h. Van-mounted AN/TRC and carrier telephone equipment to be used as a back-up to the inter-island cable system.
   i. A radio monitoring facility under operational control of the J–5 Division, Hq, JTF–3.
   j. Transmitting and receiving equipment for special services radio broadcast station.
   k. A signal warehouse.
   l. A communications installation and maintenance shop.
   m. A crystal grinding facility for all elements of the Task Force.
2. Ascertain tactical communications requirements and be prepared to implement such requirements during alert periods.

2.3.4 Delegation of Responsibilities

1. The Signal Officer, TG 3.2, was charged with the following responsibilities:
   a. Advisor to CTG 3.2 on signal matters.
   b. Coordination of all instructions from higher headquarters regarding signal activities; i.e., plans, operations, installations, maintenance, security, supplies, supervision, and inspections.

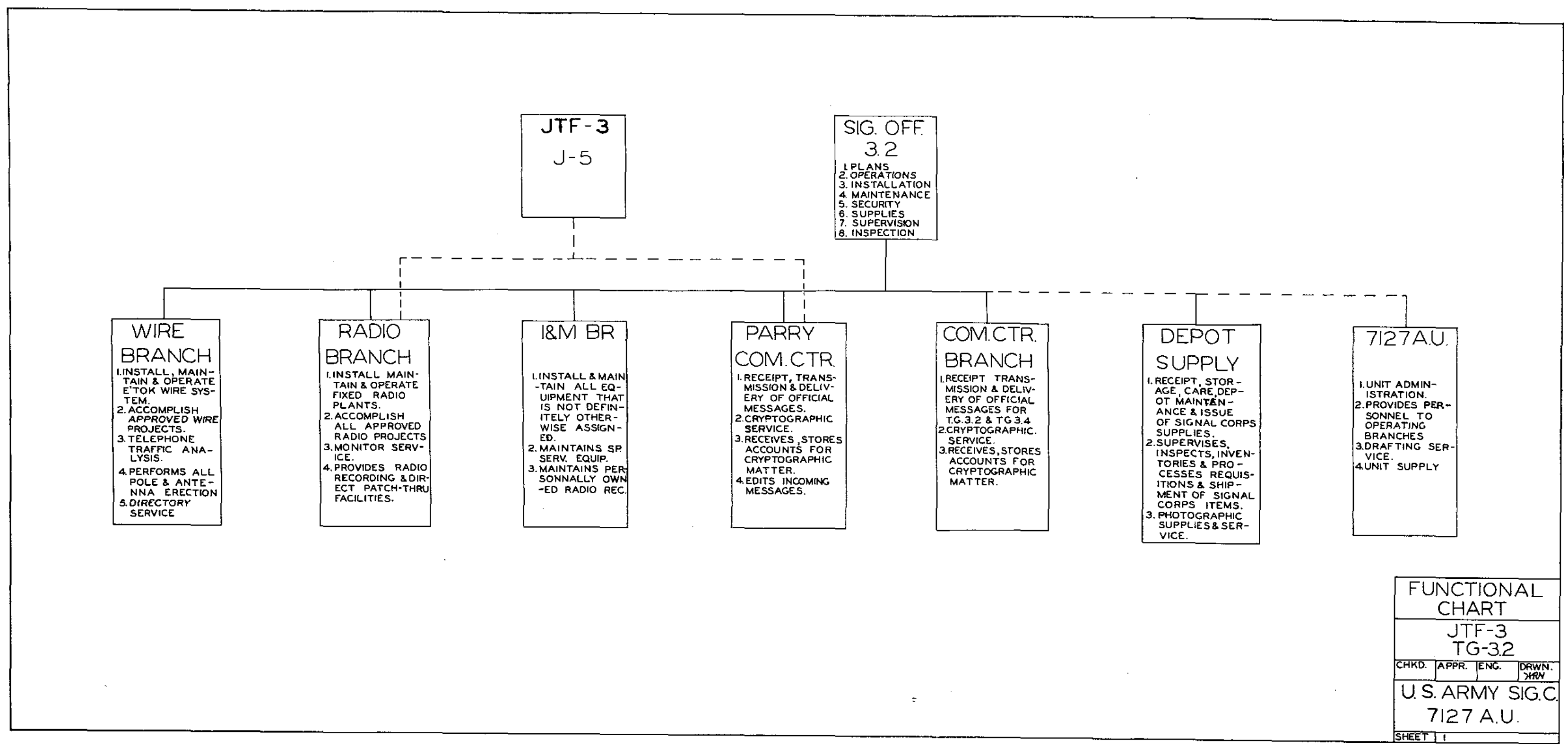

FIGURE 5. Functional Chart 7127 AU, Communications Detachment TG 3.2

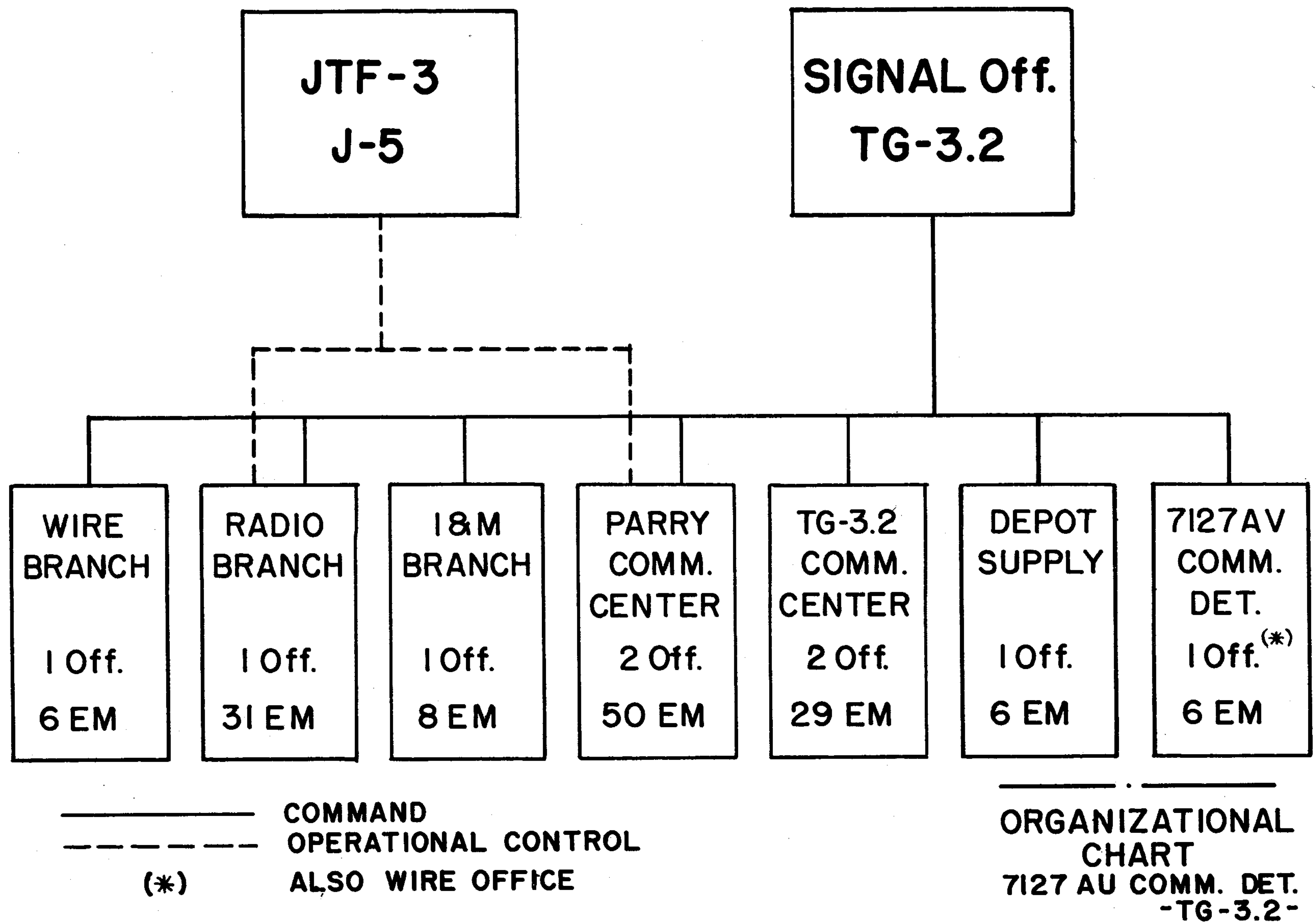

FIGURE 6. Organizational Chart 7127 AU, Communications Detachment TG 3.2

c. Maintenance of liaison with the J–5 Division, Hq, JTF–3, and with the communications officers of associated task groups.

d. Determination of officer assignments within the 7127th AU Communications Detachment.

e. Direction of signal operating sections and the exercising technical supervision over the 7127th AU and depot signal supply activities.

f. Preparation of signal orders as required.

2. 7127th AU Headquarters responsibilities included:

a. General administrative functions of the communications detachment.

b. Coordination with G–1 and the AG on matters pertaining to personnel and administration.

c. Provision of personnel to the Signal Operating Section.

d. Providing required drafting services for Signal Operating Sections.

e. Providing for normal supply functions relative to communications detachment and operating sections.

3. Wire Section responsibilities included:

a. Installation, maintenance, and operation of the Eniwetok Island wire system.

b. Erection of pole and antenna requirements for all sections as required.

c. Publication and distribution of telephone directories for Eniwetok Island.

4. Radio Section responsibilities:

a. Installation, maintenance, and operation of fixed plant radio facilities.

b. Installation, operation, and maintenance of a radio monitoring facility under operational control of the J–5 Division, Hq, JTF–3.

c. Special radio recording or direct patch-thru facilities as requested.

5. The Eniwetok (TG 3.2) comm center was charged with:

a. Receipt, transmission, and delivery of official messages originating on Eniwetok Island.

b. Cryptographic operations for TG 3.2, TG 3.4, and all other units stationed on Eniwetok Island.

c. Receipt, storage, accounting, and destruction of cryptographic material in the custody of TG 3.2.

d. Editing of incoming messages and reproduction of additional copies for delivery to the Adjutant General.

6. The Parry (JTF–3) communications center, under operational control of the J–5 Division, Hq, JTF–3, was charged with:

a. Receipt, transmission, and delivery of official messages originating and terminating on Parry Island.

b. Keying radio teletype circuits to USARPAC and to Los Alamos.

c. Cryptographic operations for JTF–3, TG 3.1, TG 3.3, and associated subordinate units.

d. Receipt, storage, accounting and destruction of cryptographic material required for the operation of the Parry communications center.

e. Reproduction of incoming messages on ditto carbon for release to the AG, Hq, JTF–3, TG 3.1, and Holmes and Narver, contractors.

7. Installation and Maintenance Section responsibilities included:

a. Installation and maintenance of all communications equipment not delegated to other communications sections.

b. Installation and maintenance of special services radio broadcast station and special services radio receivers.

c. Maintenance and repair of privately owned radio receivers when this could be accomplished without the use of government supplies or the expenditure of government funds.

d. Such other electronic repairs (electronic organs, projection equipment, etc.) within the capabilities of personnel and facilities.

[redacted]

8. Depot Supply Section responsibilities included:
   a. Receipt, storage, depot maintenance and issue of Signal Corps supplies.
   b. Accountability to the island accountable property officer for Signal Corps property.
   c. Supervision, inspection, inventory, processing requisitions and shipments of Signal Corps property.
   d. Storage and warehousing incoming shipments.
   e. Maintaining stock record accounts for Signal Corps property.
   f. Initiating requests for training films and photographic supplies to provide minimum photographic service.

2.3.5 Hq, JTF–3, arranged with the Department of the Army to so phase the shipment of personnel for assignment to the 7127th AU Communications Detachment in four increments to arrive at Eniwetok at times when the various communications facilities would be ready to operate, however, the following deficiencies were encountered:

1. Department of the Army procedure in assigning personnel to the 7127th AU Communications Detachment was to place levies on the various Zone of the Interior Army Commands for a certain number of enlisted men by MOS (without regard to grade) to be shipped as casuals through the overseas replacement depot to arrive at Eniwetok on the dates established by Hq, JTF–3. G–1, Department of the Army, considered a requisition filled once a levy was placed on a ZI Army, and no record of shipment or follow-up was maintained by that office. A shipment of 69 enlisted men scheduled for assignment to the 7127th AU in August of 1950 was diverted at Camp Stoneman and shipped to Korea to meet an urgent operational requirement. G–1, D/A did not advise Hq, JTF–3, of this diversion, nor did that office take any action to replace personnel diverted until November of 1950, when personnel were long overdue and badly needed at Eniwetok, and a tracer was initiated by Hq, JTF–3.

2. In selecting personnel for shipment to fill the D/A levy, station commanders apparently gave little thought to technical qualifications of personnel selected and in several cases it was evident that only less desirable personnel were released. In some instances, an enlisted man's MOS was changed prior to issuance of orders to fill the requisition.

3. An Atomic Energy Commission "Q" clearance was established as a prerequisite for all personnel assigned to the 7127th AU Communications Detachment, but due to the fact that a "Q" clearance required on an average of 90 days, clearance forms were initiated and personnel were shipped before formal clearances were granted. Several members of the unit were denied clearances after they had reported for duty at Eniwetok and had to be relieved and replaced.

4. The 7127th AU was not organized to include telephone operators as the telephone system on Eniwetok was an initial responsibility of TG 3.1 (Holmes and Narver, Contractors), nor did it include personnel to edit and prepare stencils on incoming teletype traffic prior to delivery to the Adjutant General. When it became necessary for the unit to assume these duties, additional personnel were not requested due to the limited housekeeping facilities on Eniwetok and the then current demand for communications personnel to meet the crisis in Korea which justified the operation of JTF–3 facilities on an austerity basis. Telephone operators were obtained by training and reassignment of personnel within the unit.

2.3.6 As a result of the above, the 7127th AU Communications Detachment was never up to authorized strength. Personnel did not arrive on site when scheduled, or required, and some personnel were either poorly trained or misassigned. The organization of this unit was tailored to perform the communications mission peculiar to Operation GREENHOUSE and did not include excess technical personnel. Messing, guard, and fatigue details were to be provided by Hq, TG 3.2. Due to a shortage of overhead personnel, it was necessary to provide some details from the communications detachment for various housekeeping tasks.

2.3.7 Considering the difficulties encountered in the procurement of personnel, time permitted some on-the-job training prior to

[redacted]

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the operational phase and although undermanned, the Army Task Group did a commendable job in the performance of its communications mission. The 7127th AU Communications Detachment also contributed materially to the construction program of TG 3.4 communications.

2.3.8 It is recommended that the communications unit of the Army Task Group be reorganized prior to the next operation to include additional code clerks, switchboard operators, and maintenance personnel for the telephone system and personnel for editing and retyping incoming message traffic for delivery to the Adjutant General. Also, since no reservoir of communications personnel is available to meet unforeseen demands, losses due to sickness, clearances, etc., an average of 10% above maximum known personnel requirements should be provided and only school graduates in the required MOS should be assigned. Communications personnel should all be properly cleared prior to departure from the ZI. The Communications Detachment should be activated in the ZI at least ninety (90) days prior to movement to the forward area to allow time for screening, clearances, unit training, and POM leave, etc., prior to shipment. They should be shipped as a unit and not as casuals, and should be shipped to arrive on site sixty (60) days prior to movement of Task Force Headquarters to the forward area. A recommended T/O for the Signal Unit of the Army Task Group, based on the mission of the 7127th AU during Operation GREENHOUSE, on the assumption that the Army Task Group will be given the added mission of cable systems; and considering the recommendations contained in Section VI of this report that a separate communications security detachment be provided, and the inclusion of an electronic monitoring and analysis team (see Sec. IV) is shown in Figure 7.

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FIGURE 7. RECOMMENDED TABLE OF DISTRIBUTION, SIGNAL DETACHMENT, ARMY TASK GROUP, FOR FUTURE MISSION AT ENIWETOK

	SPECIFICATION SERIAL NO.	SIGNAL OFFICER, ARMY TG	DETACHMENT ADMINISTRATION	RADIO TRANSMITTER STA.	RADIO RECEIVER STA.	ARMY TG COMM CENTER	TASK FORCE HQ COMM CENTER	ENIWETOK ISLAND TELEPHONE EXCHANGE	PARRY ISLAND TELEPHONE EXCHANGE	3 EACH 45-LINE TELEPHONE EXCHANGES	SUPPLY SECTION	CRYSTAL GRINDING SECTION	INSTALLATION AND MAINTENANCE SECTION	COUNTERMEASURES SECTION
Lt. Colonel														
Signal Officer, Army TG	0210	1												
Captain														
Detachment Commander	2902		1											
Lieutenant or WO														
Supply	4400										1			
Wire	0410							1	1					
Radio	0502			1									1	
Radar	0140													1
Msg Cen—Cryptographic	0224					1	2							
Message Center—Field	0221					1	1							
Msg Cen—Fixed Station	0222					1	1							
Master Sergeant														
1st Sgt	502		1											
Wire Chief	1261							1	1					
Message Center Chief	1674					1	1							
Cryptographic Supervisor	1805					1	1							
Sergeant First Class														
Wire Chief	1261							1	1					
Transmitter Attendant	1649			1										
Chief Radio Repairman	1648												2	
Countermeasures Search Spec	1840													1
Radio Traffic Analysis Chief	1709													1
Chief Submarine Cable Tech	197								1					
Chief Signal Supply Specialist	1581										1			
Receiving Station Attendant	792				1									
Chief Repeaterman	187					1	1							
Sergeant														
Cartographic Draftsman	3074		1											
Stenographer	1213	1												
Chief Telephone Operator	650								1					
Cable Splicer	2039							1	1					

REMARKS

1. A total of six officers and 89 enlisted men will be quartered on Parry Island for operation and maintenance of the Joint Task Force Communications Center and the Parry Island Telephone Exchange. The countermeasures section is also included in the above total. Six enlisted men will be quartered on each of 3 shot islands for the purpose of operating three 45-line common battery telephone systems. All other personnel are to be quartered on Eniwetok Island.

2. Radio transmitting and receiving stations contain facilities for two single channel radio teletype circuits and a minimum of two voice and CW circuits.

3. 300-line, 4-position, common battery switchboards are planned for installation on Parry and Eniwetok Islands.

4. The Countermeasures Section will operate from a mobile van on Parry Island for the purpose of investigating interference on frequencies as-

FIGURE 7 (*Continued*)

	SPECIFICATION SERIAL NO.	SIGNAL OFFICER, ARMY TG	DETACHMENT ADMINISTRATION	RADIO TRANSMITTER STA.	RADIO RECEIVER STA.	ARMY TG COMM CENTER	TASK FORCE HQ COMM CENTER	ENIWETOK ISLAND TELEPHONE EXCHANGE	PARRY ISLAND TELEPHONE EXCHANGE	3 EACH 45-LINE TELEPHONE EXCHANGES	SUPPLY SECTION	CRYSTAL GRINDING SECTION	INSTALLATION AND MAINTENANCE SECTION	COUNTERMEASURES SECTION	REMARKS
Sergeant (*Continued*)															
Crystal Grinder	150											1			signed to elements of the Task Force and recommending corrective action.
Message Center Chief	1674					1	1								
Cryptographic Technician	1805					2	6								
Cryptographic Repairman	801–1						1								
Cryptographic Repairman	801–2					1									
Manual Teletype Supervisor	2237					1	1								
Foreman, Warehouse	252										1				
Countermeasures Search Spec	1840													1	
Radio Operator	776				2										
Radio Repairman, Single Ch TTY	792			1											
Transmitting Station Attendant	798			1											
Chief Repeaterman	2187												1		
Corporal															
Supply Clerk	835		1												
Company Clerk	405		1												
Draftsman	3074		1												
Central Office Repairman	095							1	1						
Installer Repairman	097							2	2	3					
Telephone Swbd Operator	650							1	1						
Crystal Grinder	150											1			
Message Center Chief	1674					1	1								
Clerk, Message Center	667					1	4								
Cryptographic Technician	805					3	7								
Teletype Mechanic	239					1	1								
Teletype Operator	237					3	7								
Repeaterman	187					1	1						1		
Supply Technician	835										1				
Countermeasures Search Spec	1840													1	
Radio Traffic Analysis Chief	1709													1	
Powerman	166			1	1										
Radio Operator	776				4										
Radio Repairman, 1-channel TTY	792				1										

Transmitter Sta. Attendant	798			1										
Radio Repairman	648												3	
Private, First Class														
Central Office Repairman	095							1	1					
Installer Repairman	097							3	3	3				
Lineman Telephone and Telegraph	238							2	2					
Powerman	166							1	1					
Telephone Swbd Operator	650							3	3	3				
Crystal Grinder	150											1		
Clerk Message Center	667					2	4							
Cryptographic Technician	805					3	8							
Teletype Mechanic	239						1							
Teletype Operator	237					4	7							
Clerk, Stock Record	835										1			
Packing Case Maker	050										1			
Warehouseman	252										1			
Radio Operator	776				6									
Radio Repairman, 1-channel TTY	792			1	1									
Transmitter Sta. Attendant	798			2										
Radio Repairman	648				1								4	
Private														
Truck Driver	345		1											
Telephone Swbd Operator	650							8	8	6				
Installer Repairman	097									3				
Clerk, Message Center	667					3	4							
Clerk, General	055										1			
Packing Case Maker	050										1			
Total Enlisted		1	6	8	17	30	57	25	27	18	8	3	11	5
AGGREGATE		2	7	9	17	33	61	26	28	18	9	3	12	6

Officers: 15
Enlisted: 216

2.4 Task Group 3.3 Communications Organization

2.4.1 Composed of the Communications Officer and three (3) commissioned assistants, the Communications Section of the Staff of Commander, Task Group 3.3, was organized in such a manner as to best discharge its responsibilities to Commander, Task Group 3.3. Communications being a command function, the Staff Communications Officer became a Section Head directly responsible to the Commander to organize and supervise all communications in order that the Commander would be able to carry out his assigned mission and in order to provide the communications as required by Annex F to JTF–3 Field Order No. 2 (Revised). The relationship of the Staff Communications Officer to Commander, Task Group 3.3, and to the other Section Heads within the Staff Organization is shown in Figure 8.

2.4.2 The mission of the Staff Communications Officer, TG 3.3, included:

1. Organization and supervision of Staff Communications in accordance with current directives, operation orders, and plans.
2. Organization and supervision of visual and radio communications for the entire command, and initiation of training and operating methods designed to improve the efficiency of communications within the command.
3. Supervision of communication security for the entire Naval Command.
4. Supervision of the operation of the rapid communication system aboard the flagship, including the cryptoboard.
5. Supervision of assignment and training of staff and flagship communication and electronics personnel.
6. Supervision of the custody of the staff registered publications.
7. Supervision of the Naval Postal Service for the entire Command.
8. Maintenance of security classification control.
9. Preparation of that portion of Operation Plans and Orders pertaining to communications.
10. Maintenance of continuing records of the material condition and operating characteristics of the electronics equipment of ships and craft assigned to this Command.
11. Coordinate radar and RCM with other combat information both within the flagship and with all other units of the Task Group.
12. Insurance that the maximum use of presently installed radar and RCM equipment was in accordance with established doctrine.

2.4.3 As provided in Article 0511, U. S. Navy Regulations, 1948, flagship and staff communications personnel, both officer and enlisted, shall be integrated in order to carry out the communications responsibilities of the Command. The Flagship Communications Officer became the principal assistant to the Staff Communications Officer and directly supervised the Communications Section. The resulting organization of the Communications Section is shown in Figure 9.

2.4.4 Although the Navy does not prohibit the use of enlisted personnel in the cryptoroom of a command, Commander, Task Group 3.3, felt that because of the nature of the operation, it would be preferable to employ only officers as Communication Watch Officers (CWO) and on the cryptoboard. These officers acting as CWO were responsible for the proper conduct of all communication activities during their watch, including supervision of communication personnel on watch, and insuring that all messages were handled in accordance with existing instructions.

2.4.5 In addition to his duties as CWO, an officer of the Communications Section was detailed to act as the Custodian of Registered Publications for Commander, Task Group 3.3, and was responsible to:

1. Draw and maintain up-to-date, the RPS-distributed publications within the allowance of the command.
2. Maintain the proper security of all classified publications within his custody and inform all those to whom these publications are issued of the proper stowage and other security requirements, includ-

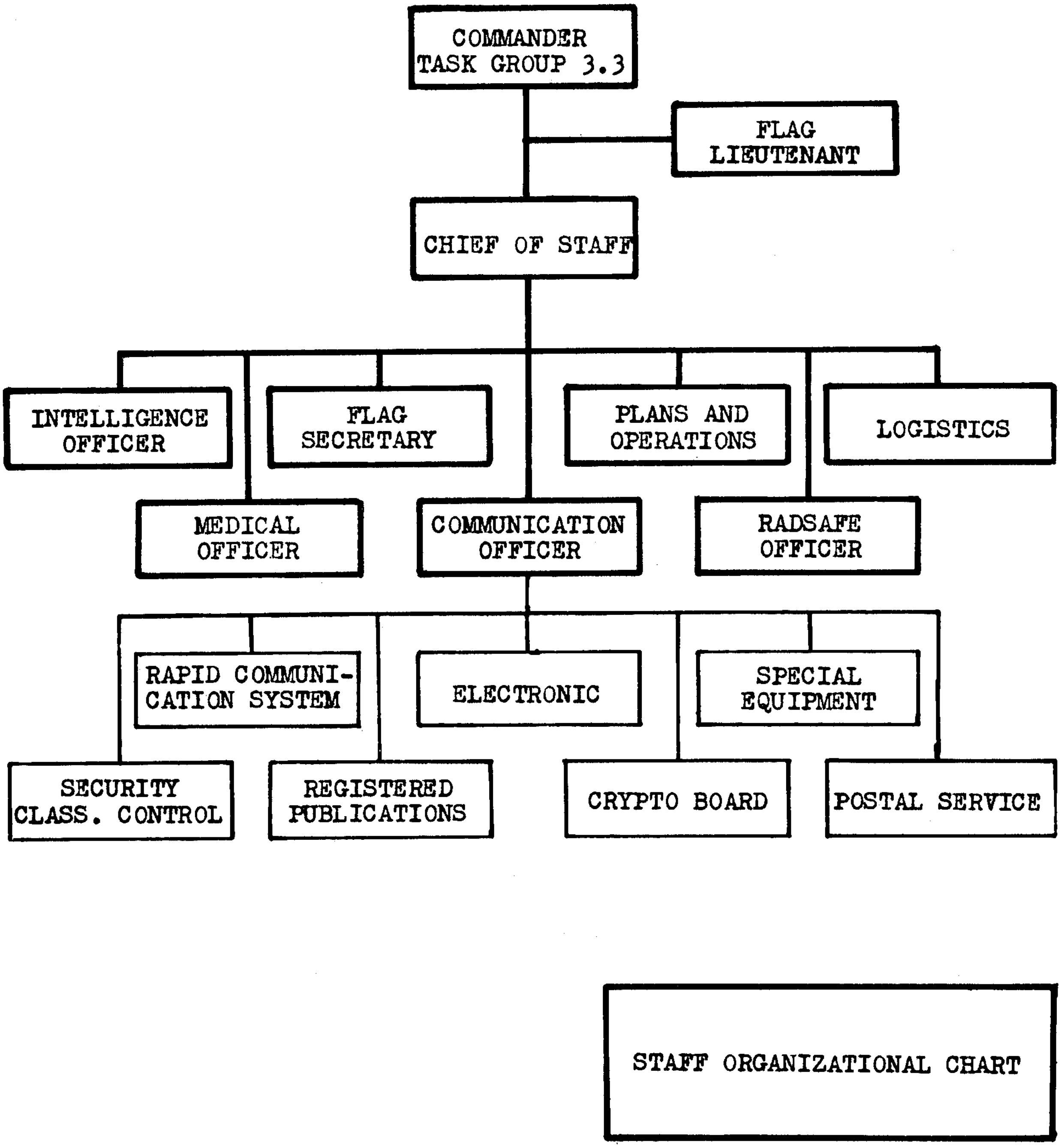

FIGURE 8. Organizational Chart Task Group 3.3

ing the requirement for a check of the List of Effective Pages by the recipient when prescribed.

3. Enter all changes and corrections to publications issued to the command.

4. Bring each new publication to the attention of Commander, Task Group 3.3, and to such other persons as the Commander may direct, or to those who, by virtue of the subject matter contained in the publication, may need to know.

5. Maintain a Destruction Bill for classified publications under his cognizance as required by Article 6–46, U. S. Navy Security Manual.

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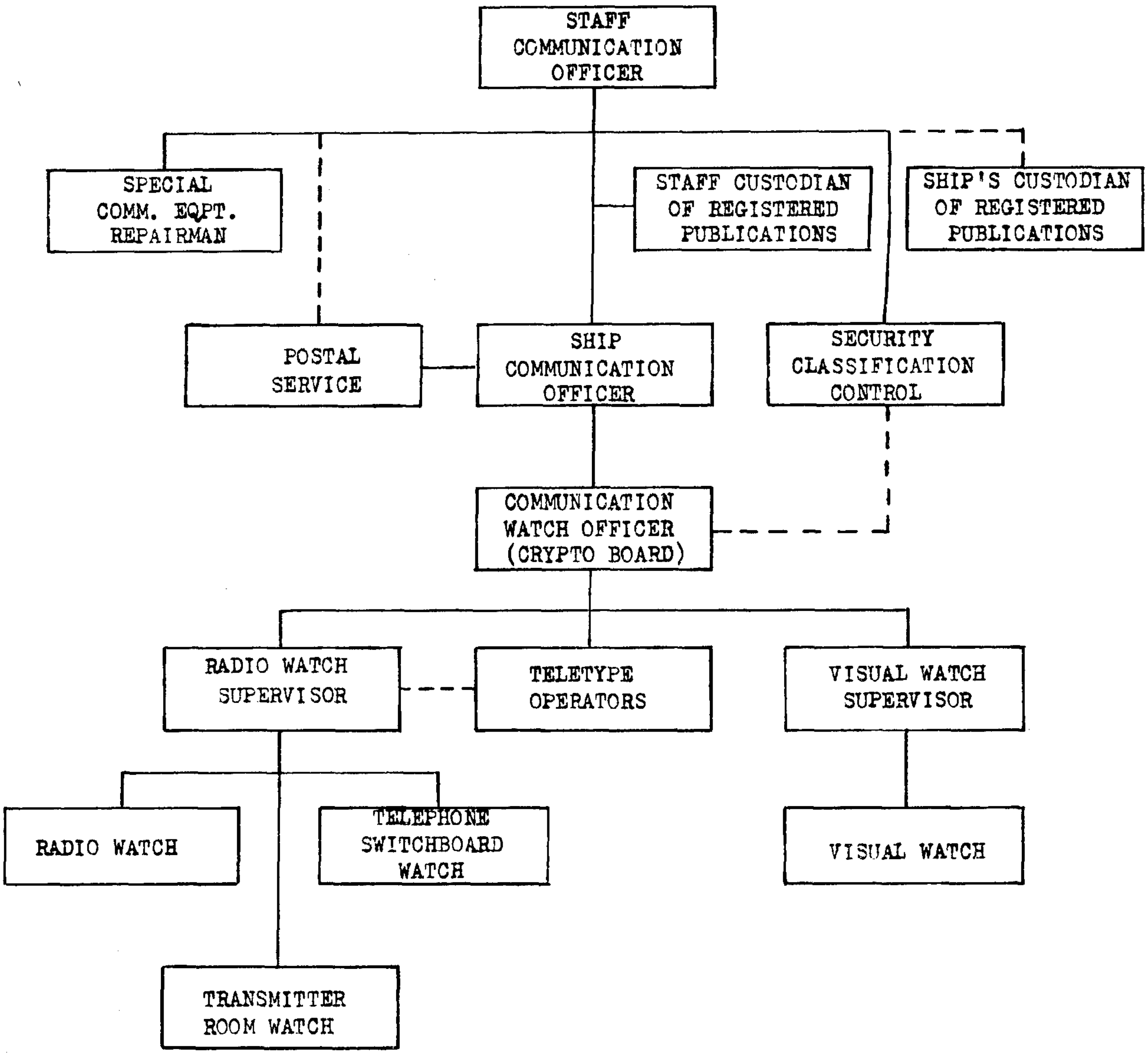

FIGURE 9. Organizational Chart, Communications Section TG 3.3

2.4.6 The Radio Supervisor was responsible for the proper handling of all radio traffic and was in complete charge of all radio personnel assigned to his watch and of the radio equipment in use, including the technicians assigned to its operation.

2.4.7 The Signal Supervisor was responsible for coordinating and supervising the operations and activities of the signal watch to the end that the maximum efficiency in handling visual traffic would be maintained with a minimum of noise, delay, and confusion.

2.4.8 Personnel requirements, both officer and enlisted, necessary to carry out the communication responsibilities of the Naval Task Group Commander are shown in Figure 10. The Naval Task Group Commander should request from the Chief of Naval Operations an interim allowance of personnel in the amount of the difference between the personnel actually serving on the flagship and the requirements as shown in Figure 10. Vessels other than the flagship assigned to the task group normally have an adequate allowance of communication personnel. The Staff Communication Officer, should, however, assure himself that these vessels have sufficient personnel to operate a 4-section watch—a lesser number of sections presents a definite fatigue/morale problem.

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FIGURE 10

PERSONNEL REQUIREMENTS
NAVY TASK GROUP COMMUNICATIONS SECTION

Officer Requirement

	RANK	NUMBER
STAFF COMMUNICATION OFFICER	LCDR	1
FLAGSHIP COMMUNICATION OFFICER	LT	1
COMMUNICATION WATCH OFFICERS (includes officer messengers, cryptoboard officers and registered publications custodians)	LT/LTJG	6

Enlisted Requirement

	RATE	NUMBER
PETTY OFFICER-IN-CHARGE	RMC	1
WATCH SUPERVISORS	RM1	4
CW AND VOICE OPERATORS	RM2	6
	RM3	14
MESSENGERS (breakdown, etc)	RMSN	4
TELETYPE OPERATORS	TE2 a/o TE3	4
TELEPHONE SWITCHBOARD OPERATORS	TEM3/TEMSN/RM3/ RMSN	4
COMMUNICATION YEOMAN	TE2	1
COMPARTMENT CLEANER	RMSN	2
MASTER-AT-ARMS	RM1/RM2/TE1/TE2/	1
TECHNICIANS (for repair of special and boat equipment)	ETC	1
	ET1/ET2/ET3	3
SONOBUOY RECEIVER OPERATORS	SO1	1
	SO2/SO3	5
TOTAL OFFICER REQUIREMENT		8
TOTAL ENLISTED REQUIREMENT		51

2.5 Task Group 3.4 Communications

2.5.1 Task Group 3.4 was organized into eight Task Units as follows to meet AEC requirements for Operation GREENHOUSE as directed by Hq, JTF–3.

1. 3.4.1 Hq, Squadron, TG 3.4.
2. 3.4.2 Experimental Aircraft Unit.
3. 3.4.3 Communications Unit (AACS).
4. 3.4.4 Weather Reconnaissance Unit (Based at Kwajalein).
5. 3.4.5 Weather Unit.
6. 3.4.6 Liaison Unit.
7. 3.4.7 Rescue Unit.
8. 3.4.8 Documentary Photography Unit.

Each of these units comprised small islands of communication personnel to fulfill the unit communication requirements as directed by TG 3.4, Deputy Chief of Staff, Communications.

2.5.2 The position of the Deputy Chief of Staff, Communications and Electronics, permitted him to report directly to the Chief of Staff and Commander, and was responsible for the following staff actions:

1. Performance of duties required for the overall supervision of all communications and associated activities within Headquarters, Task Group 3.4, and subordinate units.
2. Advising the Commander and/or his staff on matters pertaining to communications and establishing policies and procedures governing the employment and operation of communications activities, facilities, and equipment.
3. Establishing Task Group 3.4 communications requirements and the Air Operations Center.
4. Planning and determination of the requirements of equipment and materiel for additions, deletions, and changes to installed communications systems of Task Group 3.4.
5. Maintenance and calibration of all electronics equipment utilized by Task Group 3.4.

[redacted]

[redacted]

6. Communications and Electronics Plan including Task Group 3.4 frequency plan, call signs, routing indicators, and delivery groups, encoding, decoding, and the cryptographic plan if required.
7. Training of personnel in the use of communications equipment and maintenance of efficient communications with Task Group 3.4 and with attached and supported units.
8. Establishing communications facilities including the use of wire, radio, message center, messages, and supervised radio silence when in effect.
9. The criteria of equipment, airborne and ground, as needed by Task Group 3.4.
10. Supervision of location of radar equipment, selection of site, and the installation, operation, and maintenance of the attached radar operating group.
11. Technically advising Deputy Chief of Staff, Materiel, to insure provisions for communications in the implementation of the construction program as related to electronics equipment, sites, airstrips, buildings, and monitoring of communications equipment peculiar to the needs of Task Group 3.4.
12. Assuring proper orientation of all personnel as regards emergency warnings, proper voice procedures of aircraft, coordination of communications and units affected, ascertaining when spurious transmissions may interfere with control and instrumentation circuits, and insuring that special instructions are issued after field surveys have been made in the operational area.

2.5.3 A total of seven officers were assigned to the Office of the Deputy Chief of Staff, Communications and Electronics. The senior officer (0200) was Division Chief. An Electronics Officer (0141) acted as Assistant Division Chief and was assisted by a Radio Officer (0200). Three officers comprised the communications staff of the Air Operations Center; these included the Officer-in-charge (1014), the Communications Officer (0200), and the Electronics Officer (0140). The remaining officer (0141) acted as staff airborne electronics equipment officer, supervised the power plant section, and supervised depot electronics maintenance on Eniwetok. The Deputy Chief of Staff, Communications Organization Chart, is contained in Figure 11.

2.5.4 With due allowance for special considerations set forth in connection with the organizational position of the Air Operations Center, the principle of separating Staff and Operational Personnel and functions cannot be overemphasized. In the interest of economy of personnel, a minimum number of personnel was fitted into the Table of Distribution. There were definite personnel ceilings for the Island of Eniwetok and in the face of the rapidly developing world crisis, luxuries in personnel could not be tolerated. AACS organizational plans called for five (5) men to cover a position on a 24-hour basis; one for each of three shifts, one for a relief, and one to cover sickness. These plans were revised at the suggestion of the J–5 Division, Hq, JTF–3, to provide only four (4) men for each 24-hour operating space. Assignment of personnel within the Zone of Interior and at two sites in the forward area during the preparatory phase diminished the effective number of personnel at any one point for that period.

2.5.5 As a consequence of this, the Task Group Communications Staff, which was retained in the Zone of Interior to perfect the planning and to assist in the pre-overseas proficiency exercises, was called upon to perform many day-to-day operational duties. For future planning, the advisability of creating a definite communications operating organization within the Task Group structures, most appropriately in the Headquarters Squadron, should not be overlooked. Furthermore, the Headquarters Squadron, which was in the forward area to become the air base complement, was organized on a functional basis. There were small islands of communications personnel located at numerous points in squadron organizational charts as indicated in Figures 12, 13, 14, and 15. While there is considerable argument in favor of such an organization, the one factor which tends to outweigh all other consideration is that the commander's Staff Communications Officer is held ultimately responsible for all communication and electronic facilities associated with the com-

[redacted]

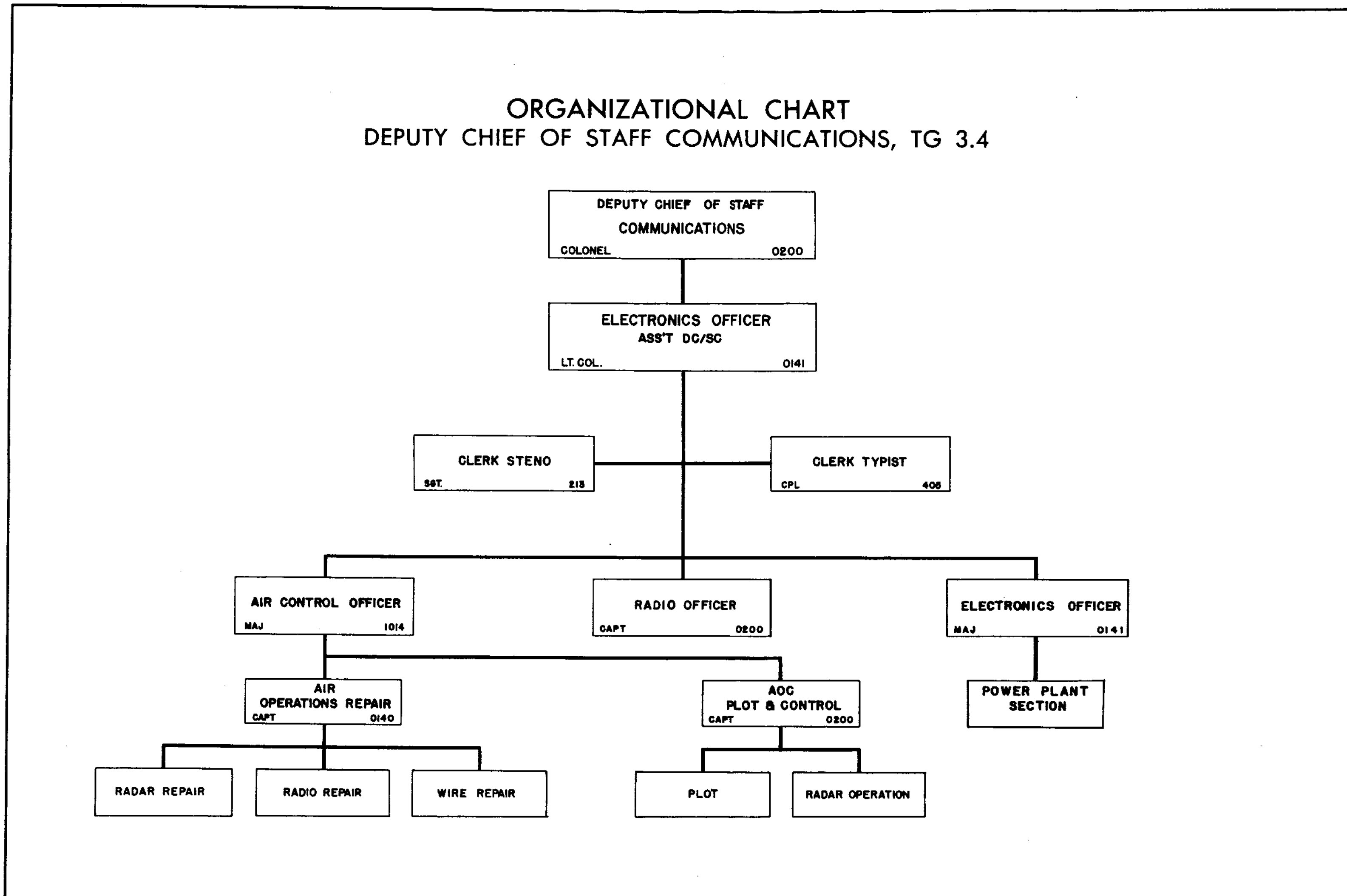
ORGANIZATIONAL CHART
DEPUTY CHIEF OF STAFF COMMUNICATIONS, TG 3.4
DEPUTY CHIEF OF STAFF COMMUNICATIONS
COLONEL 0200
ELECTRONICS OFFICER ASS'T DC/SC
LT. COL. 0141
CLERK STENO
SGT. 213
CLERK TYPIST
CPL 406
AIR CONTROL OFFICER
MAJ 1014
RADIO OFFICER
CAPT 0200
ELECTRONICS OFFICER
MAJ 0141
AIR OPERATIONS REPAIR
CAPT 0140
AOC PLOT & CONTROL
CAPT 0200
POWER PLANT SECTION
RADAR REPAIR
RADIO REPAIR
WIRE REPAIR
PLOT
RADAR OPERATION

FIGURE 11

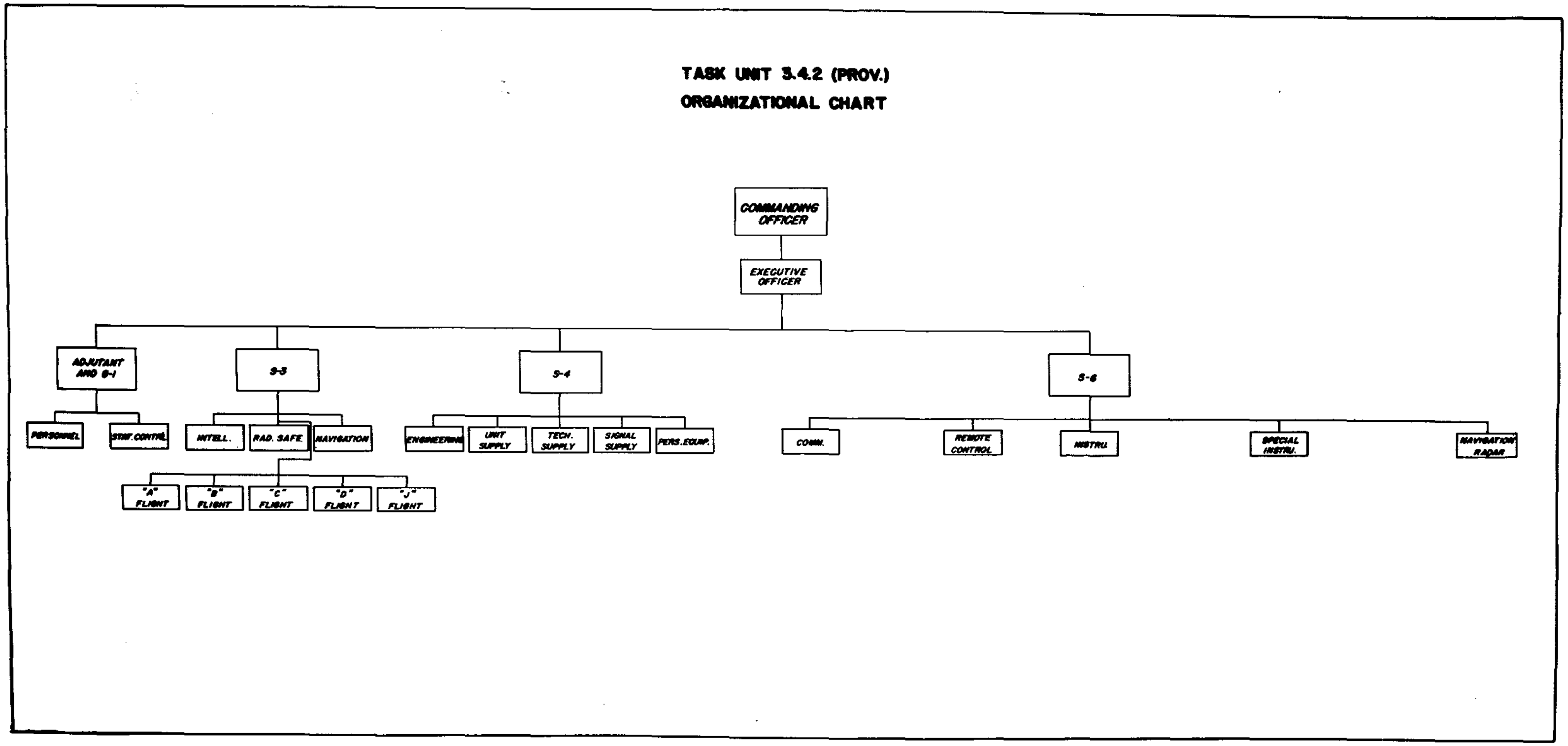
TASK UNIT 3.4.2 (PROV.)
ORGANIZATIONAL CHART
COMMANDING OFFICER
EXECUTIVE OFFICER
ADJUTANT AND S-1
PERSONNEL
STAT. CONTROL
S-3
INTELL.
RAD. SAFE
NAVIGATION
"A" FLIGHT
"B" FLIGHT
"C" FLIGHT
"D" FLIGHT
"J" FLIGHT
S-4
ENGINEERING
UNIT SUPPLY
TECH. SUPPLY
SIGNAL SUPPLY
PERS. EQUIP.
S-6
COMM.
REMOTE CONTROL
INSTRU.
SPECIAL INSTRU.
NAVIGATION RADAR

FIGURE 12

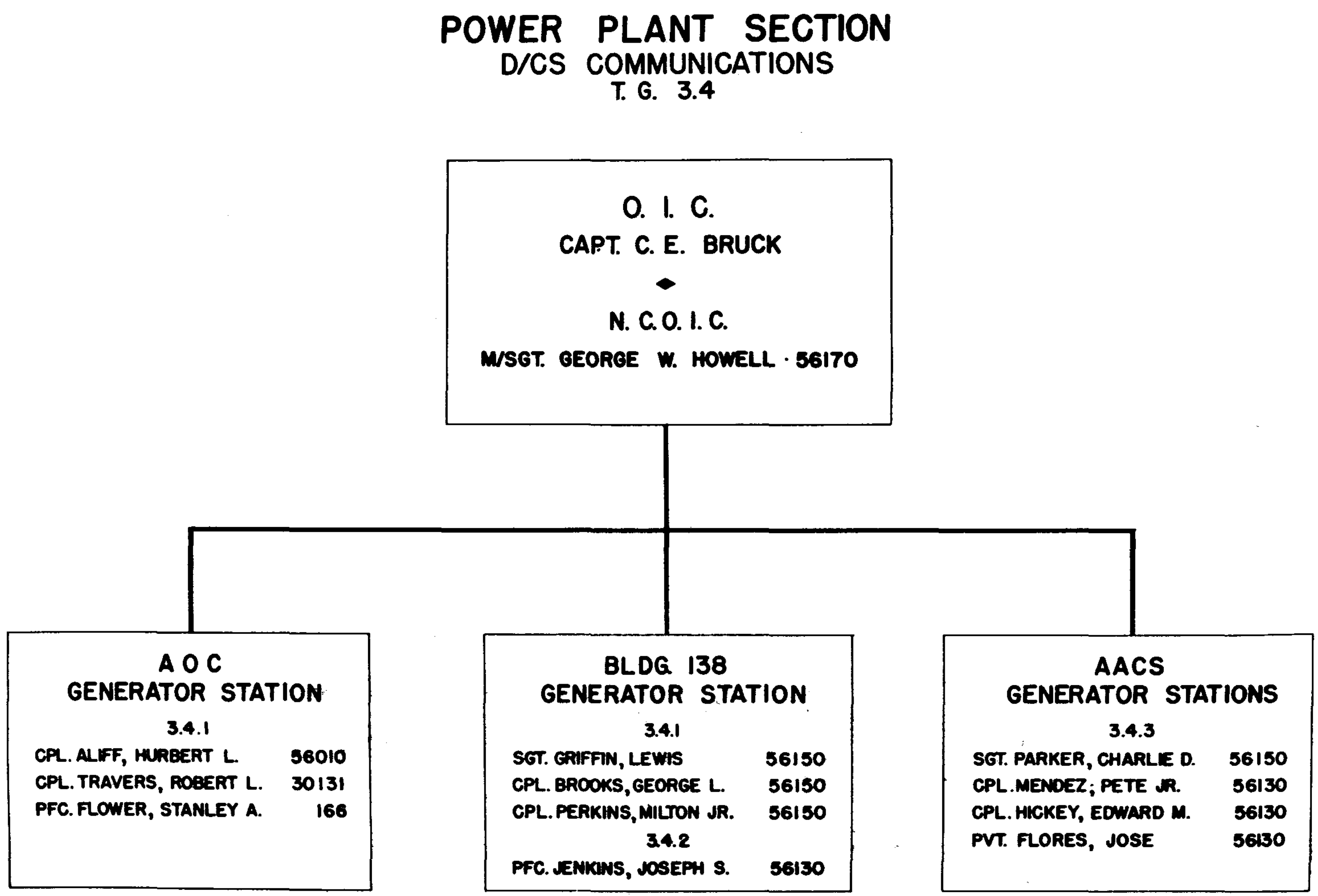
POWER PLANT SECTION
D/CS COMMUNICATIONS
T. G. 3.4
O. I. C.
CAPT. C. E. BRUCK
N. C. O. I. C.
M/SGT. GEORGE W. HOWELL · 56170
A O C
GENERATOR STATION
3.4.1
CPL. ALIFF, HURBERT L. 56010
CPL. TRAVERS, ROBERT L. 30131
PFC. FLOWER, STANLEY A. 166
BLDG. 138
GENERATOR STATION
3.4.1
SGT. GRIFFIN, LEWIS 56150
CPL. BROOKS, GEORGE L. 56150
CPL. PERKINS, MILTON JR. 56150
3.4.2
PFC. JENKINS, JOSEPH S. 56130
AACS
GENERATOR STATIONS
3.4.3
SGT. PARKER, CHARLIE D. 56150
CPL. MENDEZ; PETE JR. 56130
CPL. HICKEY, EDWARD M. 56130
PVT. FLORES, JOSE 56130

FIGURE 13

[redacted]

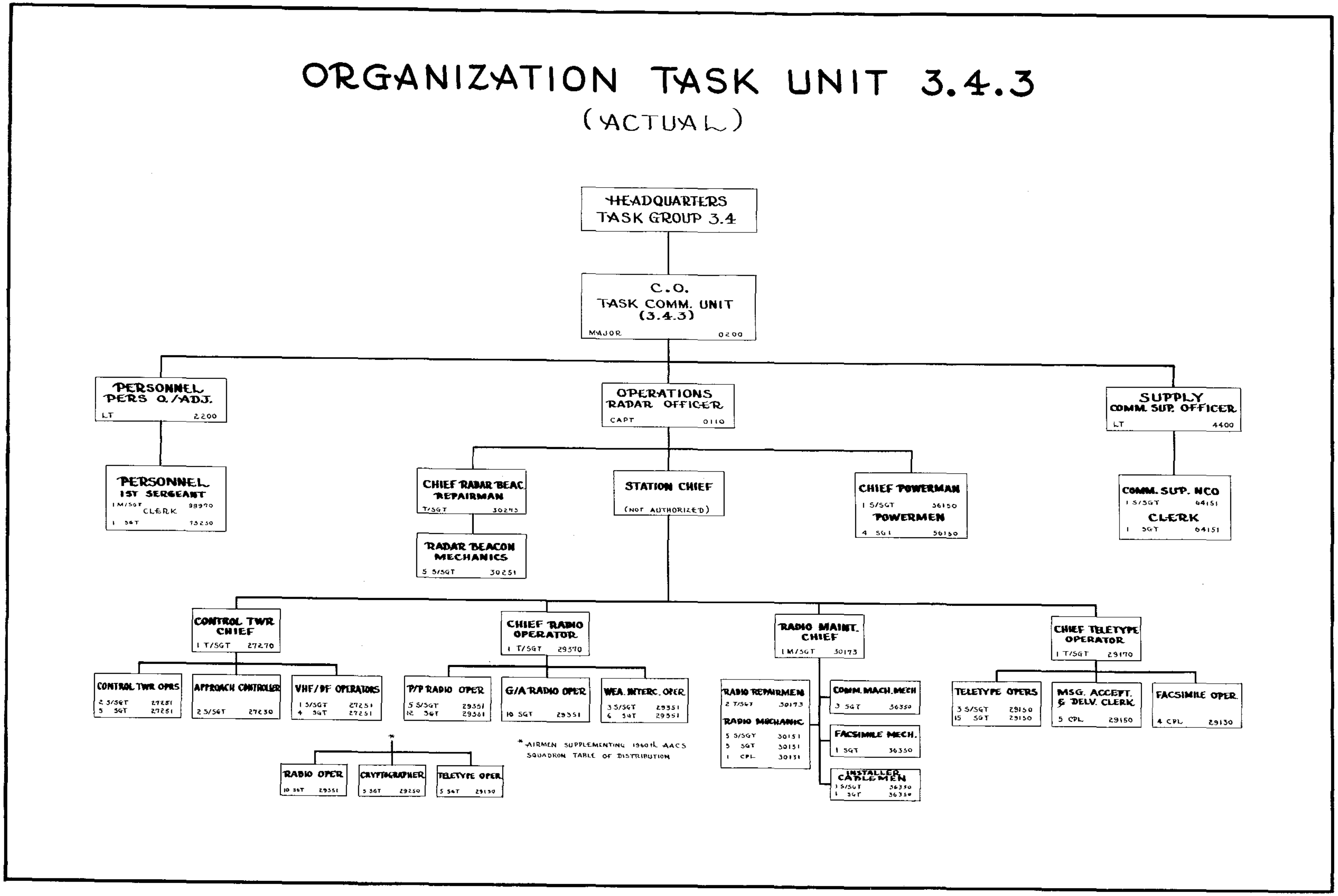

FIGURE 14

[redacted]

OGANIZATIONAL CHART

AIR TASK WEATHER RECONNAISSANCE UNIT 3. 4. 4. (PROV.)

F.P.O. 824

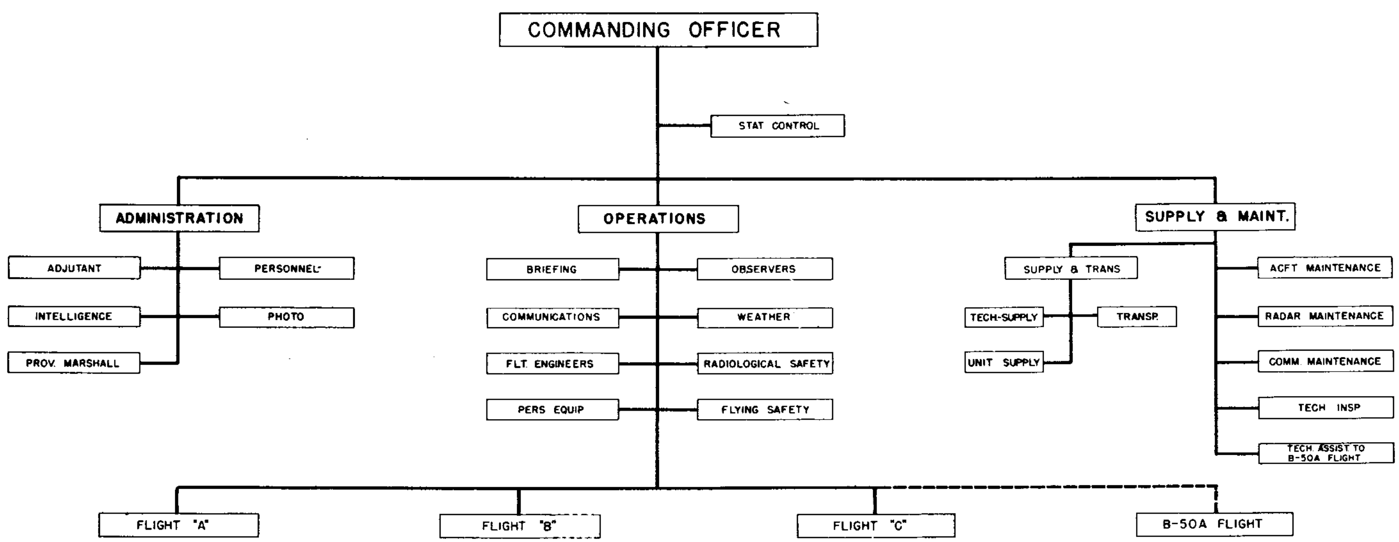

FIGURE 15

mand. For this reason, the assignment of a suitable communications officer to the Squadron Commander's staff and the placing at his disposal of an integrated communications section holds a great deal of merit.

2.5.6 In general the logistic factor of personnel was not at any time a serious threat to the proper execution of the communications mission. For the most part, personnel carrying communications specialties who were assigned to the organization, were well trained, and were experienced. Good non-commissioned material and airmen with technical skills were available. The demands made upon sources of air defense specialties by the Air Defense Command had eliminated skilled personnel in this category. It was found necessary to rely upon the Air Defense Command (then Continental Air Command) for air warning teams. More than forty of the AOC communications personnel were obtained in this manner. Their assignments were temporary in order that they could revert to parent organizations upon completion of GREENHOUSE.

2.5.7 The only significant personnel limitation was that of clerical personnel. Of the four clerk-typists who at one time or another were assigned to the section, two were released because of lack of proficiency. In general, some argument exists for the provision of specialized communications administrative personnel. A technical understanding of communications, especially as applies to terminology and a basic understanding of communications equipment and applications, would aid considerably in the proper execution of the administration attendant upon the creation of a communications program.

2.5.8 A peculiarity noted in the carrying out of this project was the variable personnel requirement. During planning stages, numerous personnel could have been employed who would have had little or no function during the operational phase. Another group of personnel could have been utilized during the final preparatory phase, their services required neither before nor after. To illustrate from cases in point, an Airways and Air Communications Service installations team was made available at Eniwetok for the purpose of constructing the facilities to be used during the operational phase; but with the arrival of the operational phase, this team became surplus to the project and as such, was released back to the parent organization.

2.5.9 The communications officer of any organization similar to Task Group 3.4, enveloped as he would be with complex logistical factors, particularly with limitations as to time, should give serious consideration to the employment of a variable table of organization for his staff section. The calling upon of such specialized organizations as Air Materiel Command and the Air Defense Command for advisory assistance cannot be over valued. It is believed that resorting to this method of personnel employment, if done with honest regards to efficiency, can result in overall personnel economy. Temporary utilization of specialized teams in this manner permits carrying on with a much smaller permanent staff, particularly during the operational phase. However, the procurement of assistance from an unrelated command can not be looked upon as relieving the communications officer of his ultimate staff responsibility for *all* communications and electronics within his organization.

2.5.10 Electronics personnel were selected primarily by MOS requirement. Due to the many types of Radio and Radar equipment to be maintained, it was necessary to screen personnel and choose those airmen best qualified on a particular set and also having the most comprehensive background on other equipments. In the case of the AN/APQ–2 maintenance, it was necessary to specially train these men due to the severe shortage of skilled APQ–24 repairmen. These personnel were trained at Eglin Air Force Base by the Western Electric Technical Representative. It was necessary to utilize personnel in dual capacities, such as the utilization of radio men on structural wiring projects. Personnel were rotated within the shop to assure that, in the event of an overload in any one section, aid could be given from another section. All personnel were very well qualified and performed their assignments well.

2.5.11 In general, personnel for operation and maintenance of remote control and in-

strumentation equipment must be given on the job training. They must possess sound basic electronic knowledge upon which to build specialized knowledge and must be generally proficient in equipment maintenance techniques.

2.5.12 On-the-job training of personnel was generally satisfactory. Late delivery of much of the equipment delayed specialized training in many instances. In anticipation of late equipment delivery, key airmen were sent to the manufacturer's plants and to Headquarters, Air Materiel Command. These airmen participated in the manufacture and testing of equipment. Experience thus gained was invaluable to TG 3.4, however, it was not entirely sufficient to offset later deliveries of equipment.

2.5.13 Eighteen (18) civilian technical representatives were assigned for duty with this organization's Electronic Section. They were from Hq, Air Materiel Command, and from various manufacturers of electronics equipment employed. In general, they were utilized as technical consultants. Because of the experimental nature of much of the equipment involved, the services of these individuals were invaluable.

2.5.14 On a project similar to Project GREENHOUSE where special clearance of all personnel is required, such clearances must be initiated as soon as personnel are selected for assignment. Further consideration must be given the formation of the Task Unit in the Zone of Interior prior to its actual movement to the forward area in order that a training program may be accomplished for personnel who are not proficient in their specialty.

Chapter III

ENGINEERING, INSTALLATION AND OPERATION

3.1 Task Force Administrative Communications Facilities

3.1.1 GENERAL

3.1.1.1 In the development of its proving ground, the AEC through its contractor Holmes and Narver, initially assumed full responsibility for Engineering, procurement of equipment, installation, operation and maintenance of all fixed plant telephone and cable facilities required at Eniwetok Atoll. In January 1950, when it was decided that the Army Task Group would build the buildings required on Eniwetok Island with materials furnished by Holmes and Narver it also became necessary for the communications office, Hqs, JTF–3, to plan the telephone system on Eniwetok Island; the installation, operation and maintenance of which became a mission of the Army Task Group. Holmes and Narver had ordered material for an aerial cable distribution system on Eniwetok but due to the air traffic on the southern end of the island and the constant movement of construction equipment consisting of cranes, derricks, etc., on all sections of the island, together with the fact that the existing underground system was in good condition, it was decided to rehabilitate and augment the existing underground cable system on Eniwetok. Equipment was ordered thru Signal Corps channels for this purpose. (See Figures 16 thru 20.) Overhead construction was employed by Holmes and Narver on Parry Island and local distribution on shot islands consisted primarily of field wire circuits laid on the ground. Holmes and Narver sub-contracted an installation team from the Pacific Telephone and Telegraph Company to install the inter-island submarine and buoy cable system.

3.1.1.2 The provision of administrative communications for JTF–3 (Figure 20) exclusive of local telephone and special wire circuits was a responsibility of the Army Task Group. Due to the delay in the assignment of an Army Task Group Signal Officer, plans for these facilities, including detailed specifications and equipment layout drawings, were prepared by the J–5 Division, Hqs, JTF–3, and forwarded to the Army Task Group for implementation. Arrangements were made for the Signal Section, Hqs, USARPAC, to furnish radio installation teams on temporary duty at Eniwetok to assist TG 3.2 in the installation of equipment in the Joint Transmitter and Receiver Building and erection of antennas. The civilian Technical Consultant assigned to the J–5 Division, Hqs, JTF–3, was also placed on temporary duty at Eniwetok to assist and supervise these installations. Army Security Agency, Hawaii, provided personnel to install cryptographic facilities in the TG 3.2 teletype communications center. Equipment in the Hqs, JTF–3 Communications Center on Parry Island was installed by personnel of the 7127th A.U. Communications Detachment.

3.1.2 TELEPHONE FACILITIES

3.1.2.1 Telephone service for JTF–3 consisted of common battery switchboards installed on Eniwetok, Parry, and the three shot islands and a dial telephone exchange and attendants cabinet installed aboard the USS CURTISS. This system inter-connected Hqs, JTF–3, the various Task Groups and scientific test sites by means of land-lines and inter-island submarine and buoy cables, backed up by VHF radio telephone and teletype circuits.

3.1.2.2 Telephone exchange facilities on Eniwetok, and Parry Islands consisted of identical two position 220 subscriber, 30 trunk, Kellogg switchboards (Figure 21). One position switchboards each providing 45 subscribers lines and 12 trunks were installed on

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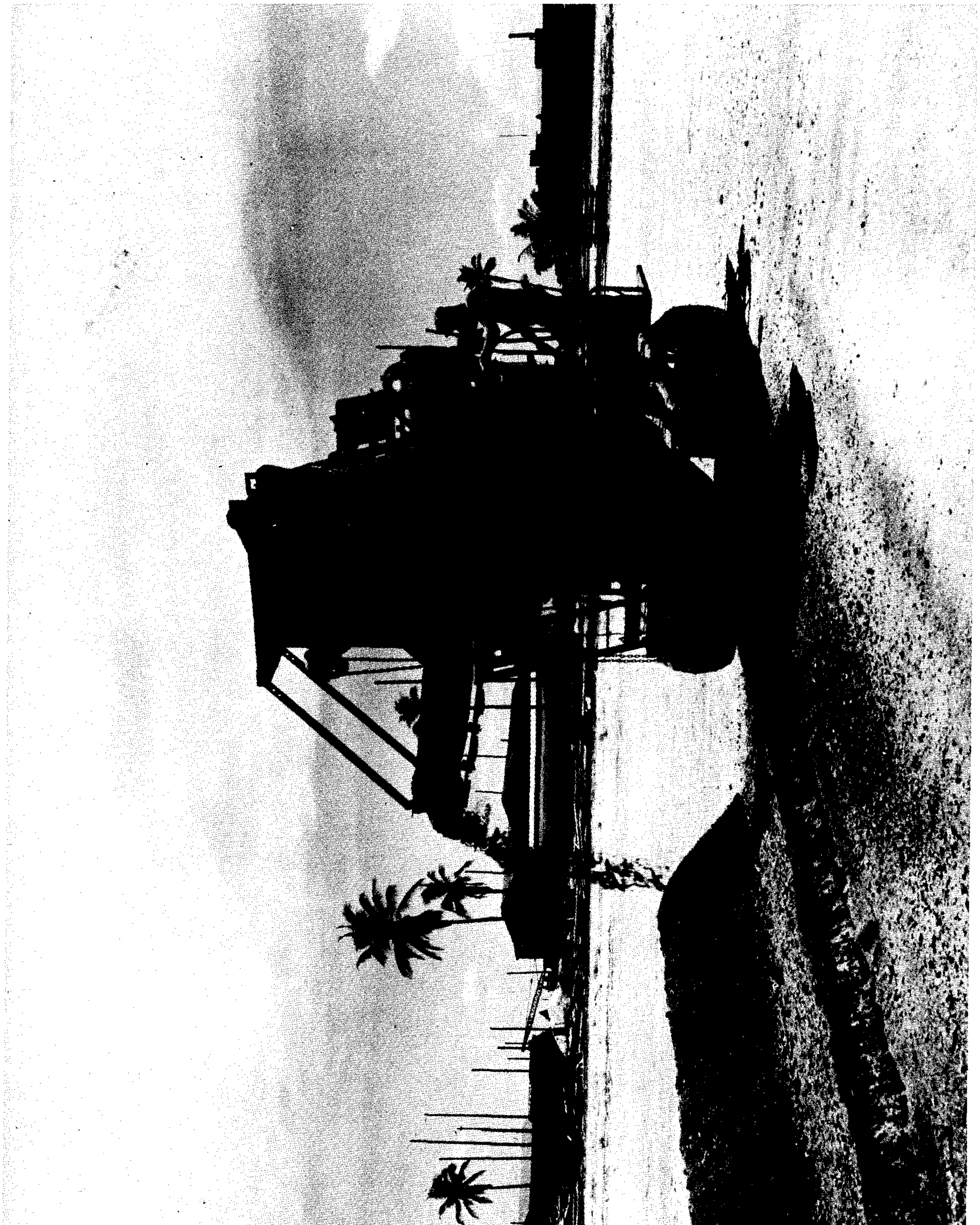


FIGURE 16. Trenching for New Main Route Cables, Eniwetok Island

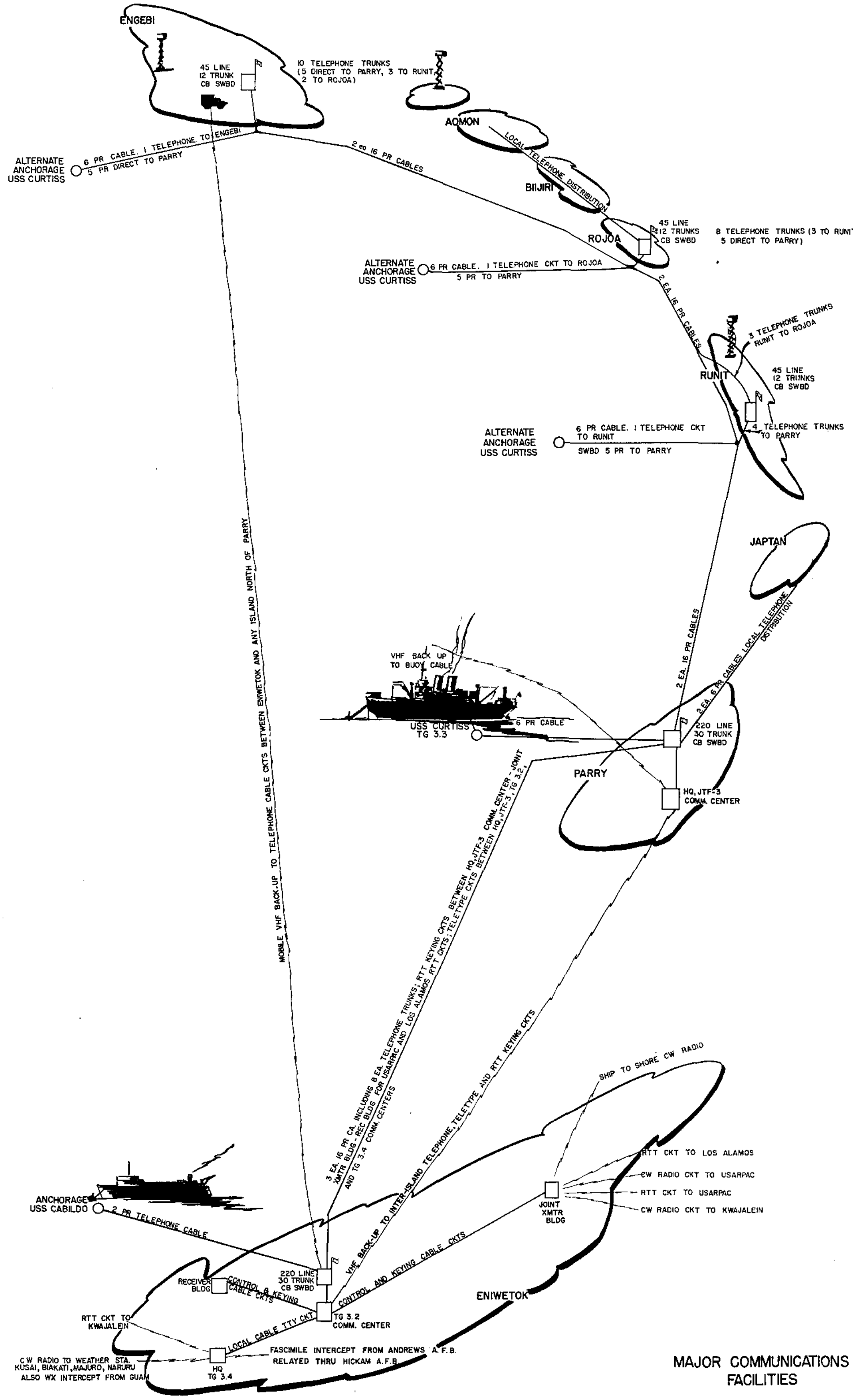
[redacted]

FIGURE 17. Placing Tap Armored Cable in Trench Dug by Barber Green Ditcher

FIGURE 18. Back Filling Cable Trench With Engineer Grader

FIGURE 19. Locating Buried Cable by Induction Method

[redacted]



MAJOR COMMUNICATIONS
FACILITIES

JOINT TASK FORCE THREE

FIGURE 20

[redacted]

[redacted]

FIGURE 21. Two Position 220 Line, 30 Trunk, Common Battery Switchboard Used on Parry and Eniwetok Islands

[redacted]

RUNIT, ROJOA and ENGEBI Islands. The exchanges served other than local subscribers; Parry served JAPTAN and provided six trunks to the USS CURTISS at cable buoy #1 off Parry (5 of these trunks were in multiple to cable buoys #2, 3 and 4); RUNIT served site "M" and provided one cable pair to cable buoy #2; ROJOA served BIIJIRI, AMON, EBERIRU, AARAANBIRU, PIIRAAI, and one cable pair to buoy #3; ENGEBI served MUZIN, TEITERIPUCCHI, BOGALLUA and provided one circuit to cable buoy #4.

3.1.2.3 The inter-island telephone cable system consisted of three 16 pair, #19 AWG, armored submarine cables between Parry and Eniwetok and two similar cables between other principal islands. A secondary distribution system from an exchange to certain adjacent islands and to cable buoys is six (6) pair cable of the same type. Loading, terminating points, including buoy locations and length of cable runs are shown on sketch (Figure 22).

3.1.2.4 The signal and control cables (Figure 23) used during Operation SANDSTONE were tested and found to be in good condition requiring only minor rehabilitation for re-use during Operation GREENHOUSE.

3.1.2.5 Dehumidifying equipment was provided for each telephone exchange. This equipment proved very effective in reducing equipment maintenance and added to the comfort of operating personnel.

3.1.2.6 The Eniwetok Atoll telephone system was engineered and equipment was ordered commercially by the AEC contractor (Holmes and Narver) approximately six months prior to activation of Hqs, JTF–3. These facilities were engineered on a basis of anticipated Task Force composition and its requirements for telephone service. The size of the Task Force exceeded original expectations and the telephone exchanges on Eniwetok and Parry Islands were inadequate to provide the accustomed commercial standard of service for Operation GREENHOUSE. (See traffic data charts on the Parry and Eniwetok exchanges, Figures 24 thru 28). This deficiency was overcome to some extent by giving preferential service to the lines of key subscribers (by means of colored switchboard line lamps), by the installation of two inter-communications systems on Parry Island (a 12 station system inter-connecting VITAL operational and control points of Hq, JTF–3 and TG 3.1). An operating procedure was also established whereby the telephone operator was directed to interrupt any call in progress if necessary to complete an urgent call. Initially this break-in was reserved for key staff personnel. However, this policy was relaxed to allow any person within the Atoll to place an urgent call in view of the fact that any individual might have occasion to report a sighting, an accident, a fire or similar emergency.

3.1.2.7 Prior to the next operation at Eniwetok, it is recommended that the fixed plant telephone system be re-evaluated to determine whether or not expansion will be required to meet task force demands. Regardless of the composition of the task force, it is not believed that telephone requirements will be greatly reduced, and based on experience gained during Operation GREENHOUSE, it is recommended that the present two position switchboards on Parry and Eniwetok Islands be replaced with four position common battery switchboards providing 300-line, 40 trunks and including an automatic ringing feature. Inter-island cables and central office facilities on shot islands are adequate. Some reinforcement of local distribution cables on Parry and Eniwetok Islands, particularly between the telephone exchange and the south end of Eniwetok Island might be required. (See Figures 29 and 30). Buoy cable circuits should be increased to twelve pair.

3.1.2.8 Based on figures submitted by the Kellogg Switchboard and Supply Company it is estimated that replacement switchboards incorporating all desired features, for installation on Parry and Eniwetok Islands would cost approximately $25,000.00 each. Specific telephone equipment trouble experienced included: (1) The hook switch in telephone instruments (1100BA Kellogg 1000 series) gave considerable trouble inasmuch as the type handset used had insufficient weight to operate the hook switch and the springs were too weak to close the contacts.

(2) The Cook "L" type main frame gave some trouble in testing outside cable. The plunger spring contacts, made of very light

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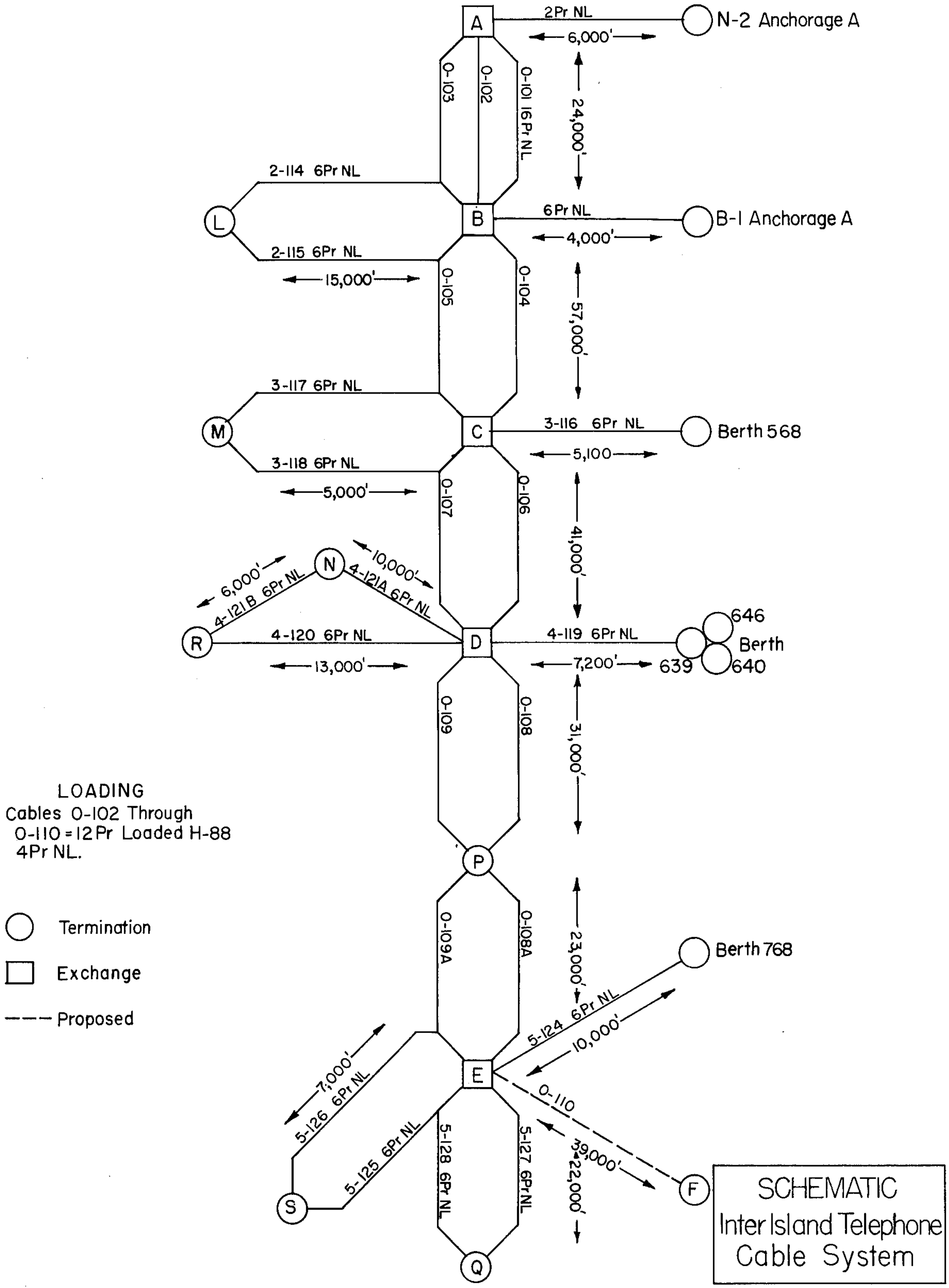
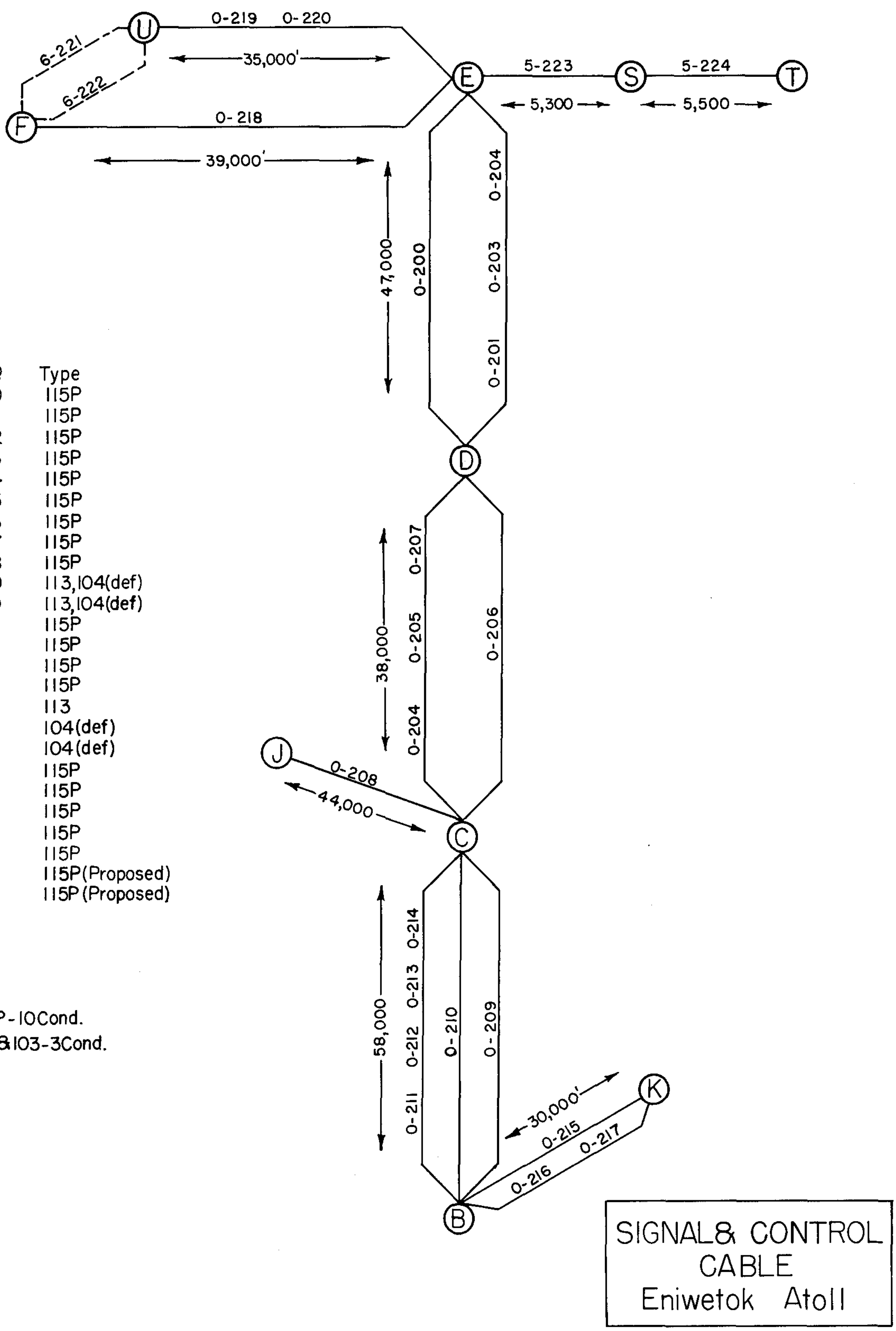


FIGURE 22

[redacted]

[redacted]



Cable Nº	Type
0-200	115P
0-201	115P
0-202	115P
0-203	115P
0-204	115P
0-205	115P
0-206	115P
0-207	115P
0-208	115P
0-209	113,104(def)
0-210	113,104(def)
0-211	115P
0-212	115P
0-213	115P
0-214	115P
0-215	113
0-216	104(def)
0-217	104(def)
0-218	115P
0-219	115P
0-220	115P
5-223	115P
5-224	115P
6-221	115P(Proposed)
6-222	115P(Proposed)

Type 115P-10Cond.
Type 104&103-3Cond.

FIGURE 23

[redacted]

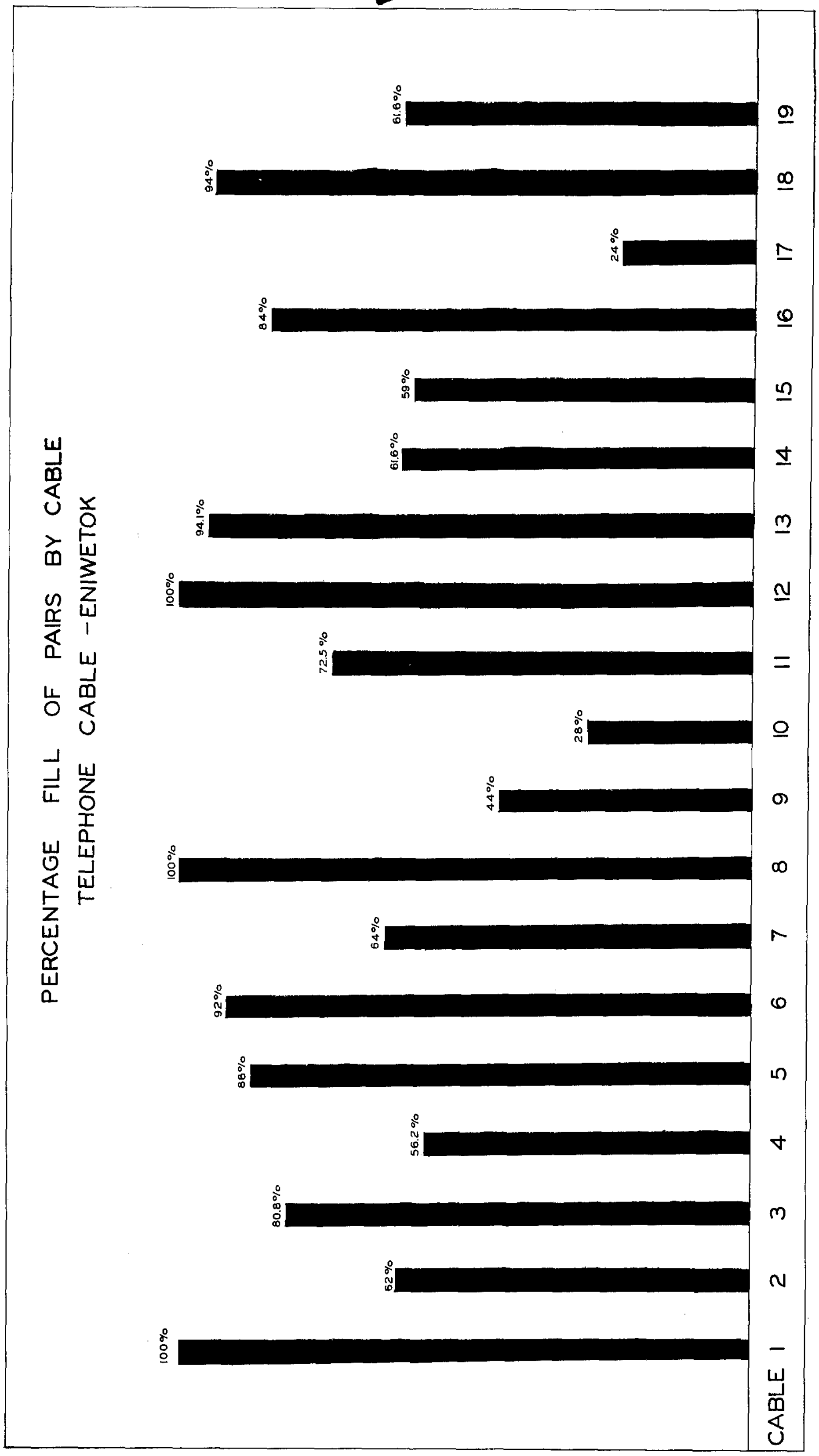

PERCENTAGE FILL OF PAIRS BY CABLE
TELEPHONE CABLE - ENIWETOK
CABLE
1 100%
2 62%
3 80.8%
4 56.2%
5 88%
6 92%
7 64%
8 100%
9 44%
10 28%
11 72.5%
12 100%
13 94.1%
14 61.6%
15 59%
16 84%
17 24%
18 94%
19 61.6%

FIGURE 24

[redacted]

FIGURE 25. MANUAL

TIME:	8–9	9–10	10–11	11–12	12–1	1–2
First Day						
Ext to Ext and Out PBX	652	542	576	457	213	590
In PBX	189	166	141	121	55	197
Info	13	9	5	2	7	19
Total	854	717	722	580	275	806
Second Day						
Ext to Ext and Out PBX	561	377	403	399	247	621
In PBX	203	176	156	118	101	189
Info	10	17	11	8	3	21
Total	774	570	570	525	351	831
Total Calls Two Days	1628	1287	1292	1105	626	1565
Aveg. Calls Day	814	643	646	552	313	783
TOTAL UNITS	790	624	627	534	304	760
Positions Operated	2	2	2	2	2	2
Positions Required	3.9	3.2	3.2	2.1	1.5	3.8

SUMMARY PEG COUNT

Station: Parry Island — Weighted Coefficient Day .97

Dates of Count 2 and 3 Apr. 1951 — Weighted Coefficient Busyhour .97

metal, often bent and grounded out the cable with no visible indication apparent. The self-soldering heat coils proved to be an admirable feature.

(3) Climate and fungi caused the carbon granules in the Kellogg telephone transmitter to harden and frequent replacements were necessary.

(4) Due to climatic conditions, insulation of wire W–143 broke and became soft. The clamps used (P–drop wire 5B3084) were too short and because of the softening of the insulation, slipped, and stripped insulation, causing shorts in the circuit.

3.1.3 COMMUNICATIONS CENTERS

3.1.3.1 Communications Center, Hq, JTF–3, Washington D. C.

Upon activation, the offices of Hqs, JTF-3, were established in the Pentagon where Department of the Army Communications Center was accessible for the passage of official message traffic. When the headquarters was moved to the main Navy Building, the Department of the Navy Communications facilities were used. When Hqs, JTF–3, moved into temporary building "U," it was necessary to establish a teletype communications center at that location and an officer and four enlisted men were assigned to the J–5 Division for the purpose of operating a teletype communications center as a tributary of the D/A communications center on a five day week basis. Initially, a one time tape system with station WAR was the only cryptographic system employed. At the outset of the Korean crisis, traffic to the forward area was delayed excessively due to a temporary overload on the ACAN circuits and additional cryptographic facilities were provided in the JTF–3 communications center to allow passage of traffic to and from the forward area direct through the Los Alamos radio teletype circuit. In January 1951, when Hqs, JTF–3, became operational in the forward area, two additional enlisted code clerks were assigned to this communications center to allow continuous operation.

3.1.3.2 Communications Center, Hqs, JTF–3.

(1) The Hqs, JTF–3 teletype communications center was established at Hqs, JTF–3 (Bldg. #221), on Parry Island for the purpose of handling all off-island radio and radio-teletype traffic for the Task Force and subordinate Task Groups when Hqs, JTF–3, was operational in the forward area. Traffic for TG 3.1 was delivered by messenger and traffic for

[redacted]

[redacted]

ITEMS

2–3	3–4	4–5	5–6	6–7	7–8	8–9	9–10	Total	Coef.	Units	B. H. Calls	B. H. Units
536	483	362	201	97	286	143	78	5216	0.90	4694	652	587
201	136	179	63	107	131	51	33	1770	1.15	2036	189	217
7	2	11	2	21	34	6	1	139	1.30	181	13	17
744	621	552	266	225	451	200	112	7125	....	6911	854	821
547	365	402	63	99	163	101	83	4431	.90	3988	561	505
197	147	132	97	45	87	69	92	1809	1.15	2080	203	233
15	14	19	2	7	28	24	5	184	1.30	239	10	13
759	526	553	162	151	278	194	180	6424	....	6307	774	751
1503	1147	1105	428	376	729	394	292	13,579	....	13,218	1628	1572
751	574	553	214	188	365	197	146					
727	557	536	208	183	354	191	142					
2	2	2										
3.6	2.7	2.6	1.0	.9	1.7	.9	.7					

Task Groups 3.2, 3.3, and 3.4 was transmitted over local teletype circuits.

(2) Equipment was installed as shown on equipment layout drawing (Figure 31) and the communications center was wired to operate from the island power system, with provision for switching to two (2) PE–95 emergency power units installed in a power building located approximately fifty (50) feet to the west of building #221.

(3) Operating space in the communications center was limited but was adequate for Operation GREENHOUSE. The rack mounting of SIGTOT equipment in the crypto vault is unique in that there is no record of a similar installation, yet considerable space was saved and equipment was more accessible for maintenance purposes.

(4) BD–74 Switchboards were obtained from the Hawaiian Signal Depot, where they were surplus, and were modified locally to make use of the jack field as a normal thru patch board. These boards were installed in the teletype rooms of the Hqs, JTF–3 and TG 3.2 communications centers in lieu of the SB–6 Switchboards shown on equipment layout drawings. All equipment in the teletype room including carrier and AN/TRC equipment and all circuits including keying circuits, local teletype circuits and trunks to the Parry telephone exchange for AN/TRC back-up of inter-island telephone service terminated on the BD–74 thus adding flexibility in the substitution of any piece of equipment or circuit.

3.1.3.3 Task Group 3.2 Communications Center.

(1) A teletype communications center was established in Hqs, TG 3.2, Bldg #15 (Figure 32), Eniwetok Island, essentially duplicating the facilities of the Hqs, JTF–3 Communications Center for the purpose of handling TG 3.2 traffic and for handling all off-island message traffic during the construction, roll-up and garrison phases.

(2) Equipment was installed as shown on equipment layout drawing (Figure 33) and two PE–95 power units were provided as a back-up to Island power.

3.1.3.4 Task Group 3.3 Communications Center.

A teletype communications center including a code room was established aboard the USS CURTISS for the purpose of handling traffic for TG 3.3 and weapons assembly personnel of TG 3.1.

3.1.3.5 Task Group 3.4 Communications Center.

Task Group 3.4, faced with an over-all shortage of code clerks within the Air Force, dis-

[redacted]

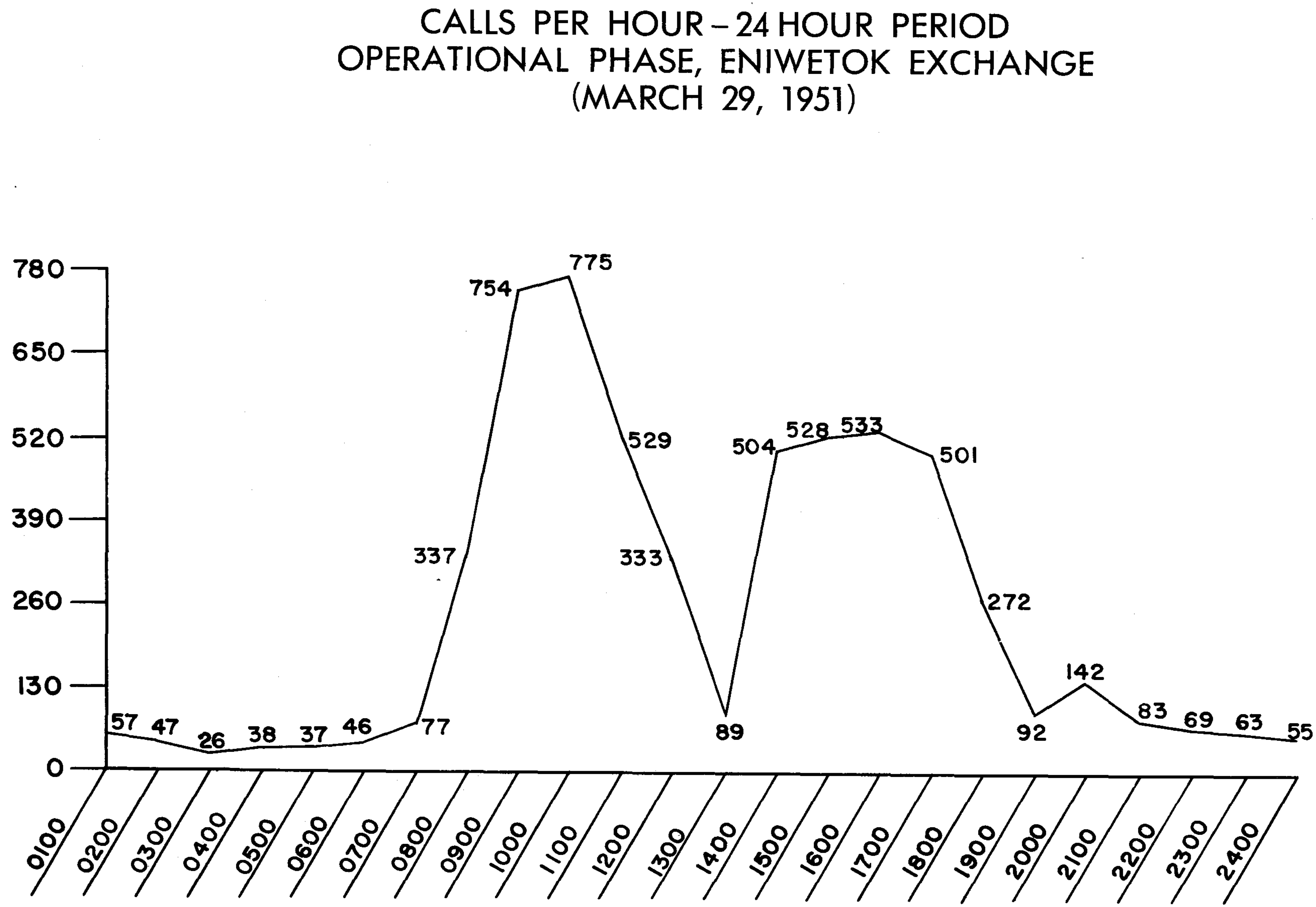

CALLS PER HOUR – 24 HOUR PERIOD
OPERATIONAL PHASE, ENIWETOK EXCHANGE
(MARCH 29, 1951)
780
650
520
390
260
130
0
57
47
26
38
37
46
77
337
754
775
529
333
89
504
528
533
501
272
92
142
83
69
63
55
0100
0200
0300
0400
0500
0600
0700
0800
0900
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
2100
2200
2300
2400

FIGURE 26

SWITCHBOARD TRAFFIC, ENIWETOK EXCHANGE

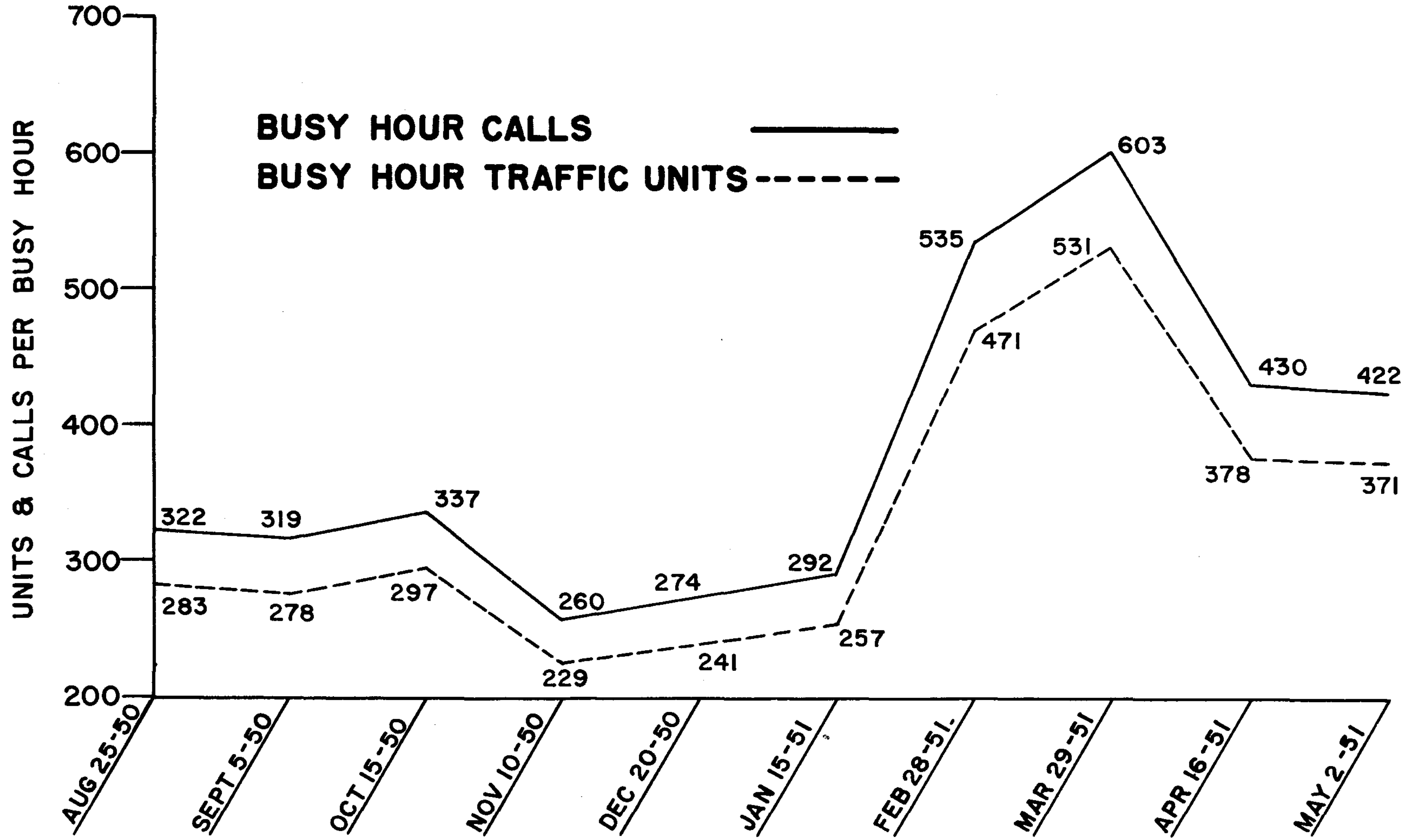


FIGURE 27

SWITCHBOARD TRAFFIC
CALLS FOR 24 HOUR PERIOD, ENIWETOK EXCHANGE

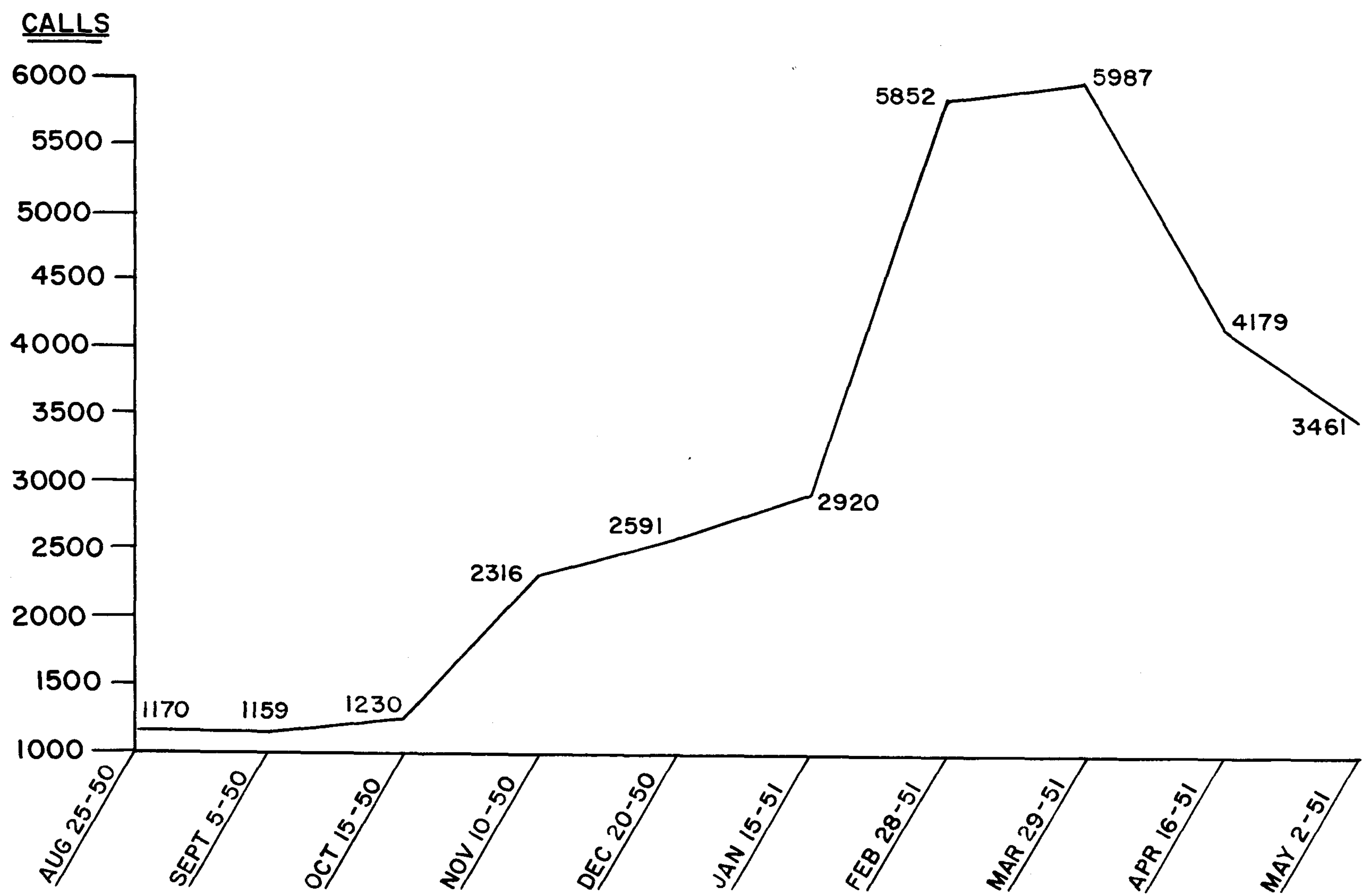


FIGURE 28

[redacted]

FIGURE 29

MAXIMUM SWITCHBOARD AND PERSONNEL REQUIREMENTS
(MARCH 1951 OPERATIONAL PHASE)

TIME	% OF TOTAL DAY	ESTI-MATED CALLS	UNITS PER CALL	WTD EXP FACTOR	ADJ	THEC OPR DIST	ROUNDED	JUDGE-MENT	2-POS SINGLE APP
7–8	5.75	330	.88	.85	2.7	2.5	3	3	2
8–9	12.5	350	.88	.85	2.7	2.5	3	3	2
9–10	12.75	775	.88	.85	4.4	4.1	4	4	2
10–11	9.0	525	.88	.85	3.5	3.25	4	3	2
11–12	5.50	335	.88	.85	2.6	2.4	3	3	2
12–13	1.50	89	.88	.85	1.1	1.0	2	1	1
13–14	8.50	500	.88	.85	3.5	3.25	4	3	2
14–15	8.75	525	.88	.85	3.6	3.3	4	3	2
15–16	9.0	533	.88	.85	3.7	3.4	4	3	2
16–17	8.5	500	.88	.85	3.4	3.25	4	3	2
17–18	4.5	275	.88	.85	2.1	2.0	3	2	2
18–19	1.5	95	.88	.85	1.1	1.0	2	1	1
19–20	2.25	145	.88	.85	1.4	1.3	2	2	2
20–21	1.0	85	.88	.85	1.0	1.0	1	1	1
21–22	1.25	70	.88	.85	1.0	1.0	1	1	1
22–23	1.0	63	.88	.85	1.0	1.0	1	1	1
23–24	1.0	55	.88	.85	1.0	1.0	1	1	1
24–1	0	00	...	...	1.0	1.0	1	1	1
1–2	0.75	50	.88	.85	1.0	1.0	1	1	1
2–3	0.5	25	.88	.85	1.0	1.0	1	1	1
3–4	0.75	45	.88	.85	1.0	1.0	1	1	1
4–5	0.75	45	.88	.85	1.0	1.0	1	1	1
5–6	0.75	50	.88	.85	1.0	1.0	1	1	1
6–7	1.25	80	.88	.85	1.0	1.0	1	1	1

EST REQUIREMENTS FOR MANNING EST ON BASIS 4-POS MULTIPLE SINGLE ANS JACK BOARD

missed plans to provide its own cryptographic facility and agreed that this service be provided by the Army Task Group. A teletype communications center, less code room, was established at Hqs, TG 3.4, on Eniwetok as a tributary of the JTF–3 Communications Center. Cryptographic work for TG 3.4 was performed by TG 3.2.

3.1.3.6 Comments and Recommendations

(1) Specifications for the Hqs, JTF–3 and the TG 3.2 Communications Centers included forced ventilation for each code room, however, electric fans to be provided by the AEC for this purpose were not furnished. To alleviate the deteriorating effect of rust and corrosion on communications equipment caused by the heat and humidity in the Eniwetok area and to increase the efficiency of operating personnel in this space, which cannot be adequately ventilated for reasons of security, it is recommended that these communications centers be provided with adequate dehumidifying equipment subsequent to the next operation.

(2) Fluorescent lighting was specified for installations throughout the Hqs, JTW–3 and TG 3.2 Communications Centers and were installed in the crypto rooms of both installations and in the teletype room of the JTF–3 Communications Center. Fluorescent fixtures should be provided in both message centers and in the TG 3.2 teletype room prior to the next operation to give adequate level of illumination without excessive heat.

(3) Fixed plant teletype equipment (commercial models #19 and #15) would have been more satisfactory for installation in the communications centers than the field equipment (TG–7–B and TG 26–A) which was used. The field equipment is bulky, occupies more space than would have been required for equivalent commercial type equipment; and the field sets included a number of components not required

[redacted]

[redacted]

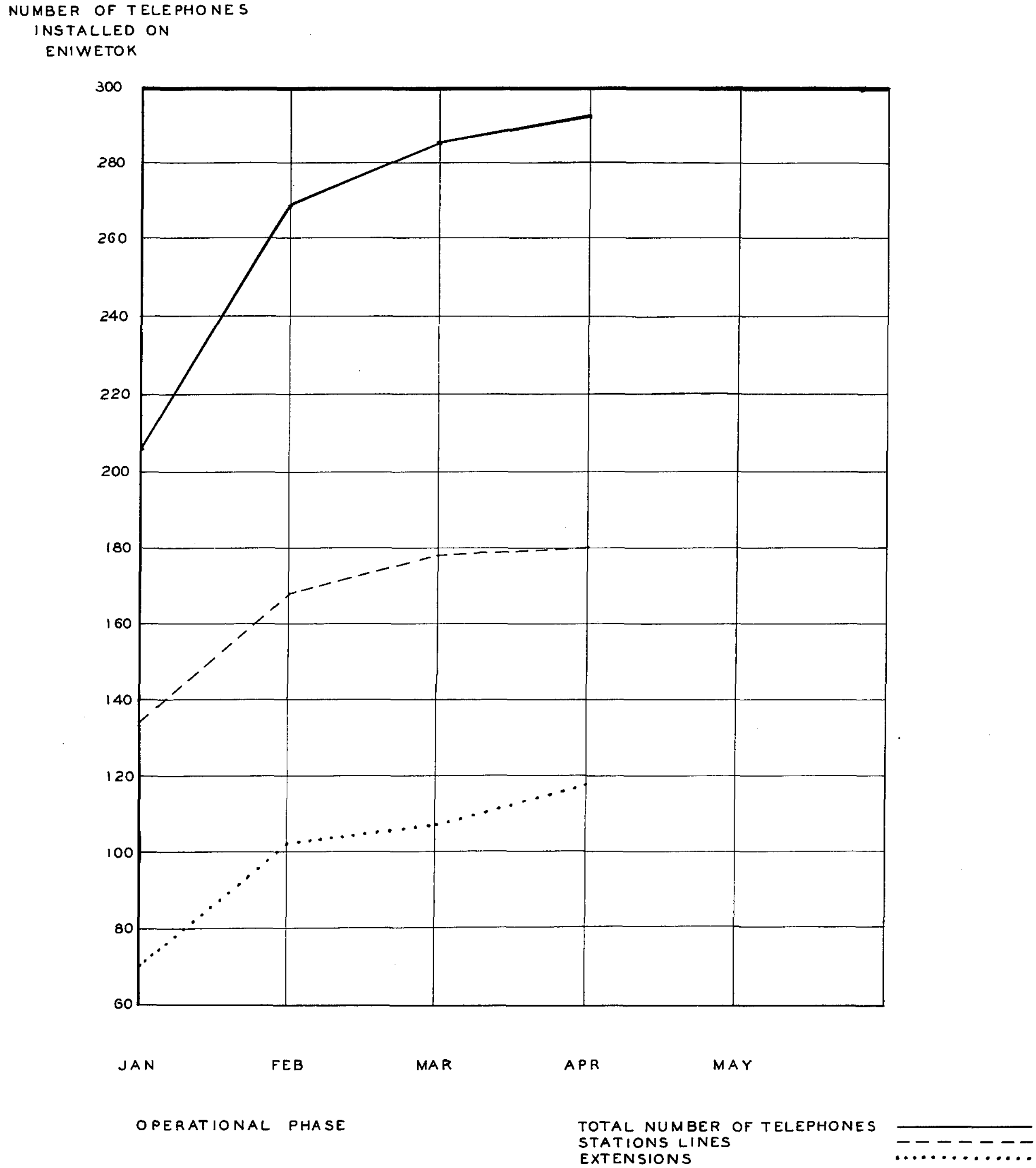
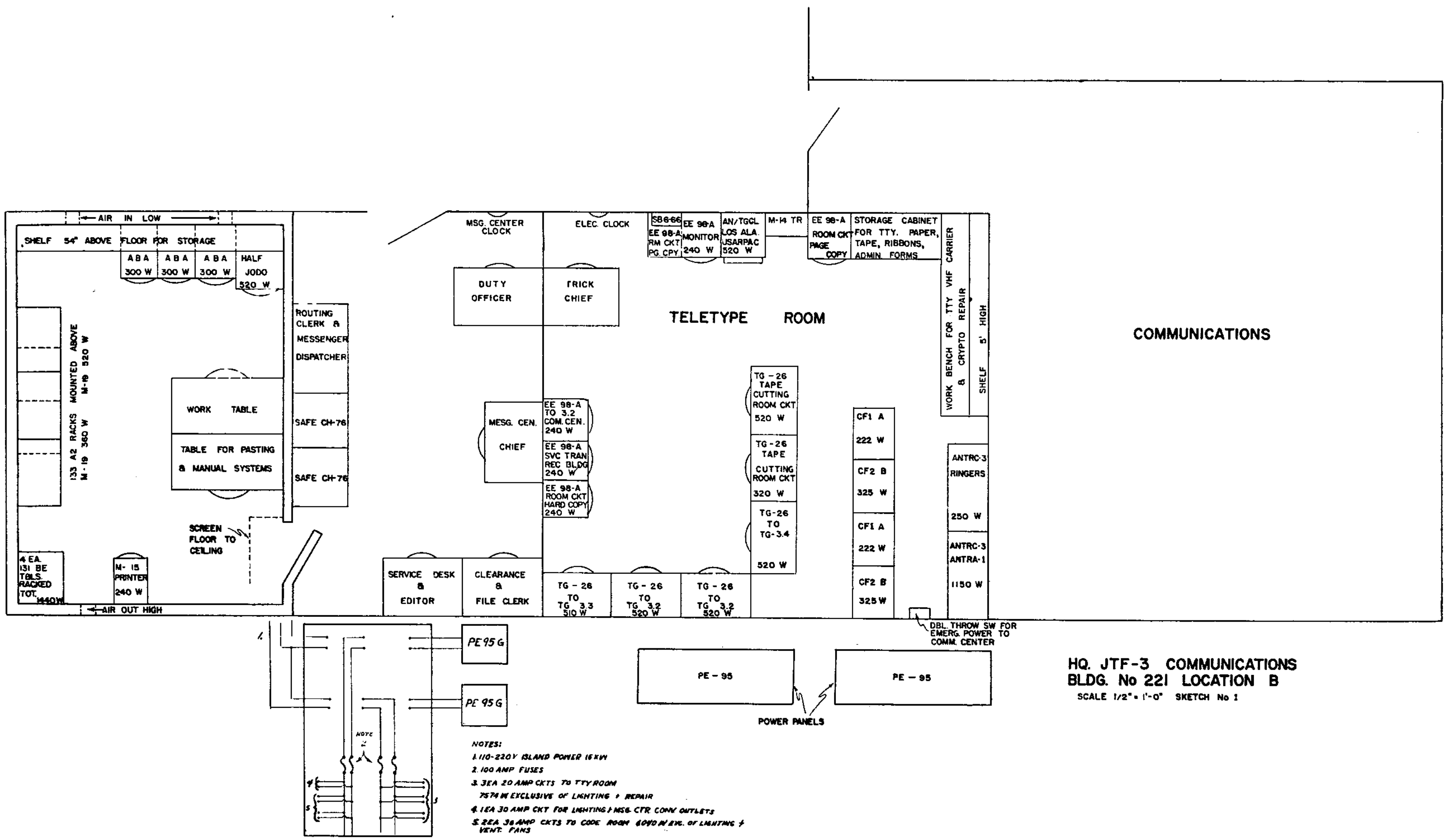


FIGURE 30

[redacted]

[redacted]



HQ. JTF-3 COMMUNICATIONS
BLDG. No 221 LOCATION B
SCALE 1/2" = 1'-0" SKETCH No 1

FIGURE 31

[redacted]

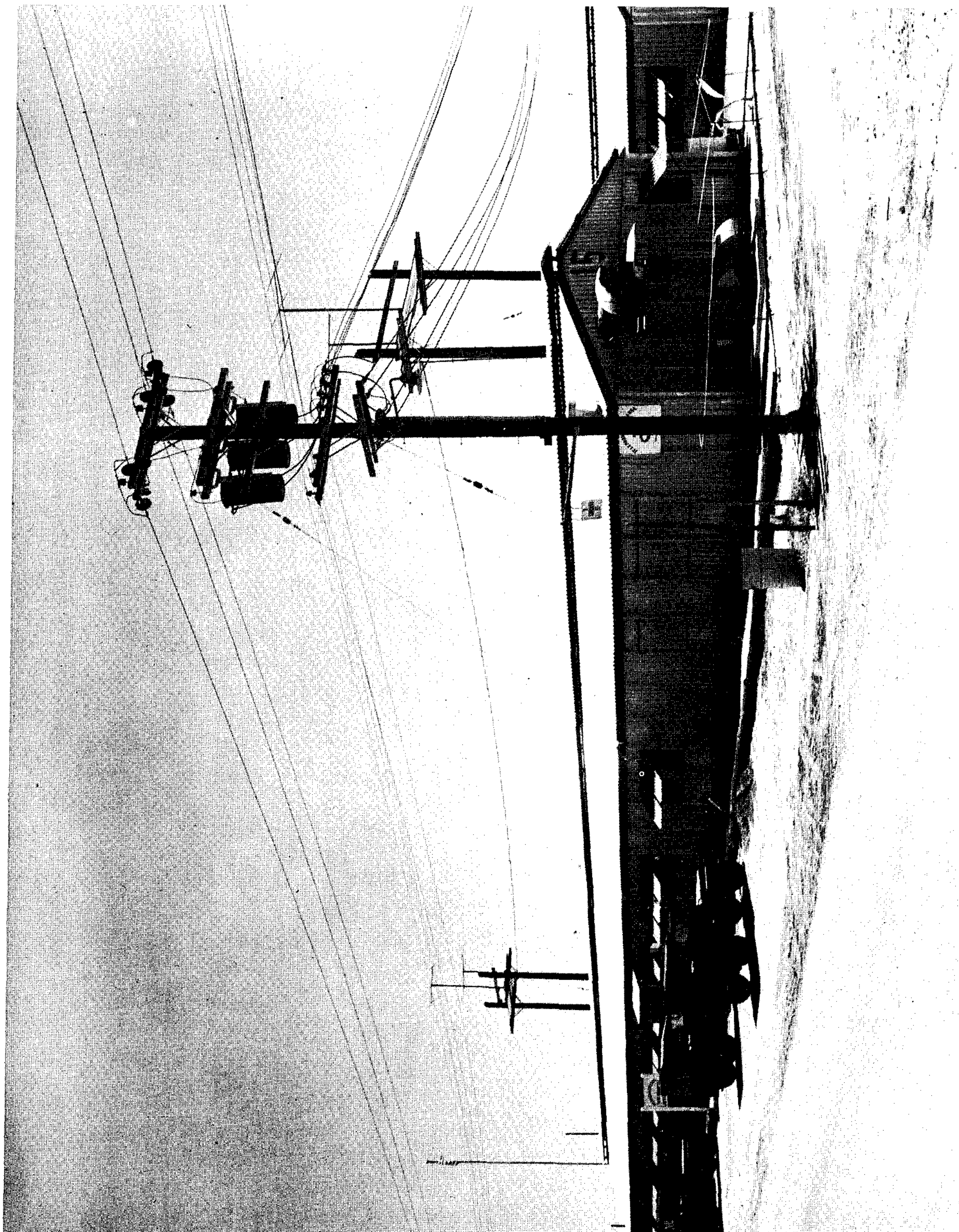


FIGURE 32. Hq TG 3.2 and Communications Center, Building 15, Eniwetok Island

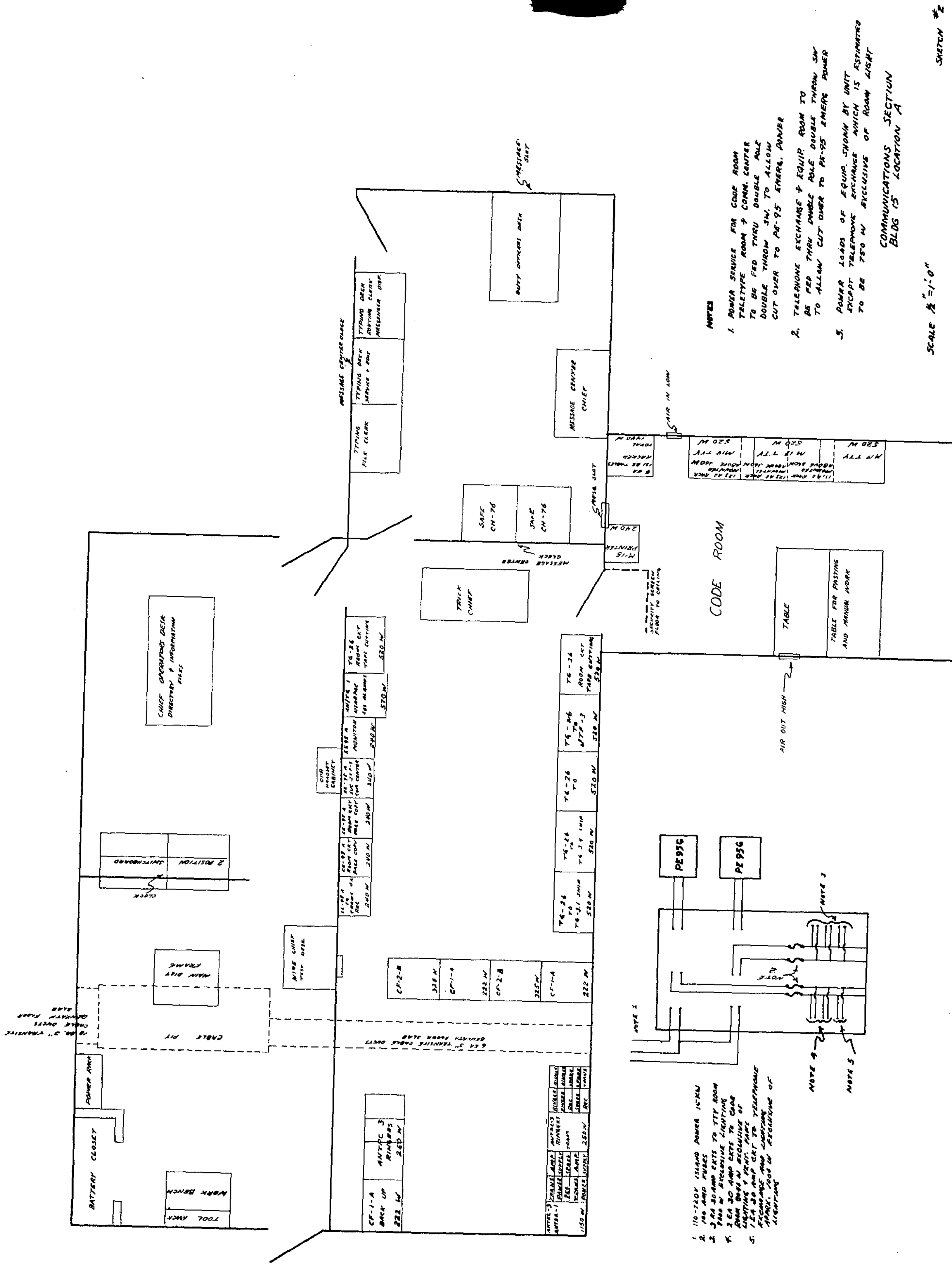


Figure 33. Equipment Layout of Communication Center TG 3.2, Eniwetok Island

which presented an additional storage problem.

(4) The performance of cryptographic work for TG 3.4 by TG 3.2 was cumbersome and time consuming. It is recommended that the Air Task Group provide its own cryptographic facilities for any subsequent operation.

3.1.4. CABLE BACK-UP FACILITIES

3.1.4.1 AN/TRC–1, CF–1A and CF–2B equipment was installed in the Hq, JTF–3 and the TG 3.2 communications centers to provide VHF radio back-up for telephone and teletype circuits using the submarine cable between Eniwetok and Parry Islands. Similar equipment supplemented by an AN/TRC–1 amplifier was installed in the Hq, JTF–3 communications center and aboard the USS CURTISS to provide a back-up to telephone and teletype circuits using the buoy cable system and to provide communications between Hq, JTF–3 and Hq, TG 3.3, when the USS CURTISS was not anchored at a cable buoy. AN/TRC–1 and CF–1A equipment was also installed in a K–53 van which, in the event of cable failure, would be dispatched to any island north of Parry Island to provide radio telephone circuits back to the Eniwetok exchange through similar equipment installed in the TG 3.2 communications center. A PE–75 power unit was available for transportation in the K–53 van for use as a source of power. The carrier and AN/TRC equipment installed aboard the USS CURTISS included all of the latest modifications. However, similar equipment received for installation in the JTF–3 and TG 3.2 communications centers, and in the van, had not been modified as recommended at the conclusion of Operation SANDSTONE. Steps have been taken to have the garrison signal detachment process this equipment thru the Sacramento Signal Depot for necessary technical changes and return to Eniwetok.

3.1.4.2 Exchange facilities on shot islands and the inter-island cable system were not damaged as the result of weapons tests. Cable between sites E and Q was damaged by a ship's anchor and cable between Sites "C" and "M" was damaged by a tractor. Back-up facilities were not required for inter-island cables except in one instance when the USS CURTISS was anchored at the ENGEBI cable buoy. Voice circuits were satisfactory but the length of the cable between the CURTISS, when anchored at ENGEBI, and the Hq, JTF–3 communications center exceeded the transmission range of the teletype circuits obtained by superimposing CF–2B carrier equipment on a 19 guage non-loaded cable pair. AN/TRC equipment was substituted satisfactorily for the cable pair in this instance, however, encryption of teletype traffic was required. The use of a non-loaded phantom circuit and carrier teletype repeater installed in the BIIJIIRI exchange, in all probability would have eliminated this difficulty had equipment been available. The procurement and installation of this equipment is recommended for use in future operations.

3.1.4.3 Some difficulty was encountered with buoy cables. The cable to the Parry buoy became defective shortly after it was installed and had to be replaced and the cable to the RUNIT buoy was damaged by a ship's anchor. On occasion the sea in the lagoon was too rough to allow connection to buoy cables and the USS CURTISS was frequently on the move from one buoy to another in the performance of its mission. AN/TRC was used in lieu of cable between the CURTISS and the JTF–3 communications center approximately 50% of the time and proved satisfactory except for security limitations.

3.1.4.4 Omni-directional antenna, contract W–36–039–SC–33679 was used between the Hq, JTF–3 communications center and the USS CURTISS to compensate for the yaw of the ship while at anchor and the changing direction of the ship while on the move. The omni-directional antenna proved more efficient than the directional antenna provided with AN/TRC equipment; and provided a gain which would not have resulted had the standard dipole been used mounted vertically. Receiving and transmitting AN/TRC antenna at the Hq, JTF–3 communications center were installed 45 feet above ground and were separated by approximately sixty (60) feet, instead of 100 feet as specified to installation personnel. As a result, some interference was experienced between the receiver and transmitter of the same system, requiring wide separation between transmitting and receiving frequencies.

These antennas should be further separated prior to the next operation.

3.1.4.5 Installation of cable back-up facilities in the TG 3.2 and the JTF–3 communications centers and in the van was accomplished by the Installation and Maintenance section of the 7127th AU Communications Detachment. Carrier and AN/TRC equipment aboard the USS CURTISS was installed at the San Francisco Naval Shipyard under the supervision of the J–5 Division, Hqs, JTF–3.

3.1.5 RADIO FACILITIES

3.1.5.1 External Task Force Communications Service.

(1) Transmitting and receiving facilities were installed on Eniwetok Island to provide direct radio teletype circuits to USARPAC, Hawaii, and to Los Alamos, New Mexico. A CW radio circuit was provided as a back-up to the USARPAC RTTY circuit and a CW radio circuit was provided between Eniwetok and Kwajalein. CW and Voice radio circuits were also provided for ship to shore communications. The Los Alamos and USARPAC RTTY circuits were keyed from the TG 3.2 communications centers during the construction and roll-up phases and from the Hq, JTF–3 (Parry Island) communications center via submarine cable pairs backed up by VHF radio keying circuits during the operational phase of GREENHOUSE. CW and Phone circuits were keyed from the receiver station which was tied into the JTF–3 and TG 3.2 communications centers by local teletype circuits. A six man civilian crew from the Hawaiian Signal Depot installed the radio and power facilities (exclusive of AACS) in the Joint Transmitter Building and in the receiver building. All antennas with the exception of that part of the receiving rhombics started by civilian crews, were erected by wire construction crews of the 7127th AU.

3.1.5.2 Joint Transmitter Building.

(1) The Joint Transmitter Building (Bldg. #4) (Figure 34), Eniwetok Island (Equipment Layout Drawing Figure 35), housed the AACS transmitters in addition to the following JTF–3 and TG 3.2 facilities:

a. A BC–339 radio transmitter and associated BC–340 amplifier to provide a 10 KW radio teletype transmitter on the Los Alamos circuit.

b. A BC–339 radio transmitter for the radio teletype circuit to USARPAC.

c. A BC–610 transmitter for a CW radio back-up to the USARPAC radio teletype circuit.

d. A BC–610 transmitter for a CW radio circuit (P–33) to Kwajalein.

e. A BC–610 transmitter for a CW radio Ship to Shore circuit.

f. A BC–610 transmitter for a Voice radio Ship to Shore circuit.

(2) The transmitter antenna farm (Figures 36, 36A and 75) included a directional rhombic to Los Alamos, a "V" to USARPAC, doublet antenna for USARPAC, Kwajalein, and ship to shore circuits and the various AACS transmitting antenna.

(3) Emergency power was provided to carry the full load of the joint transmitter building in the event of island power failure.

3.1.5.3 Receiver Building (Figure 37–40) and Equipment layout (Figure 41)

(1) The receiver room included diversity receiving equipment for the Los Alamos and USARPAC RTTY circuits, a spare radio teletype receiving position, voice and CW operating positions and keying and teletype circuits to the JTF–3 and TG 3.2 communications centers.

(2) The monitor room included receivers of the proper type to monitor all channels and frequencies used in Operation GREENHOUSE (Figure 42). Provision was made to feed the output of receivers into either 15 channel magnetic tape recorders (Figure 43), oscilloscopes, head sets or loud speakers.

(3) The crystal shop was equipped to measure the frequency of all crystals for JTF–3 radio equipment and to grind crystals when required. The crystal grinding position was obtained from USARPAC and an enlisted man of the 7127th AU was trained at Hq, USARPAC, in its use. Approximately seventy (70) crystals were ground for TG 3.4 and a lesser number were ground when required as emergency replacements for other elements of the Task Force. At the request of the Signal Officer,

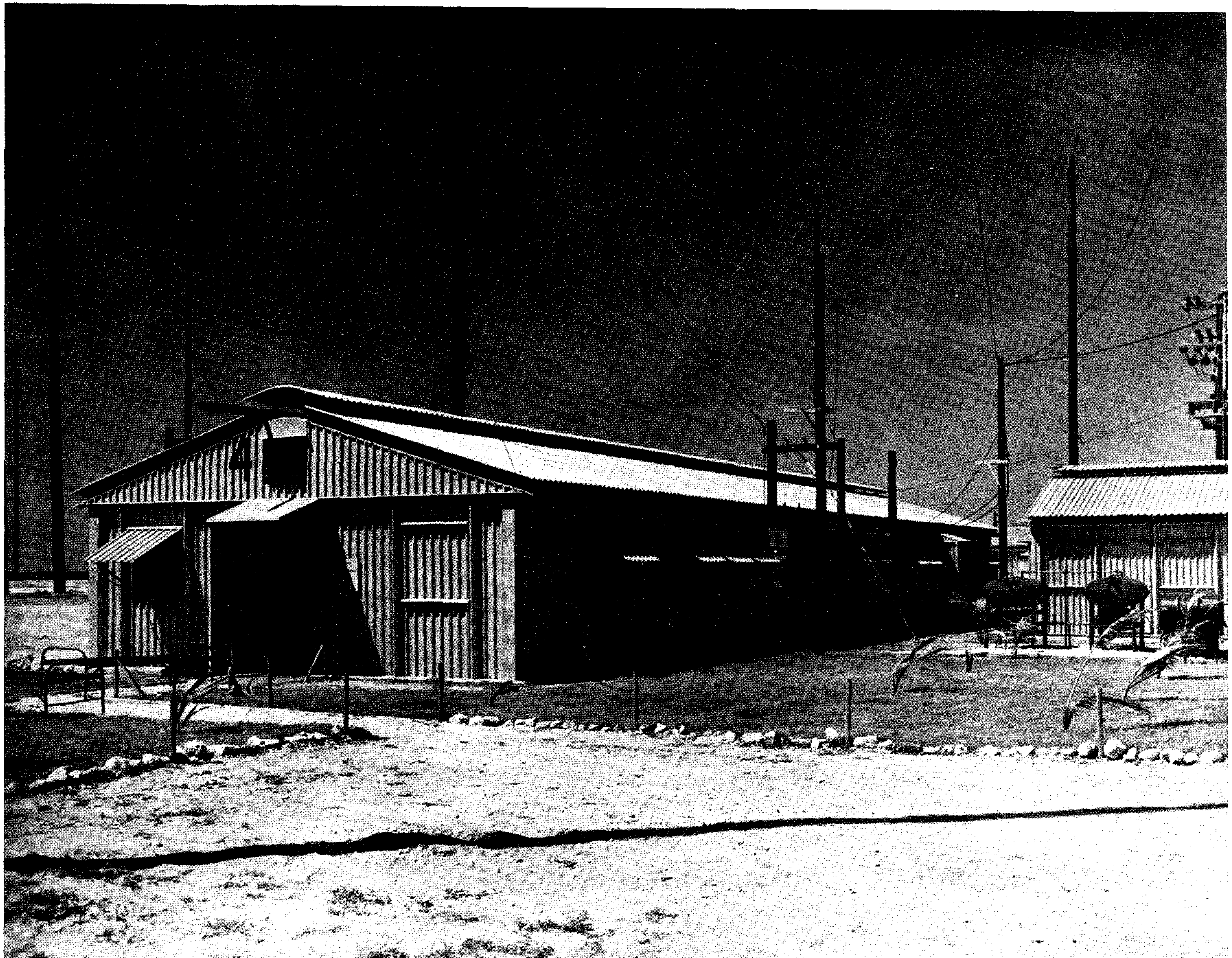


FIGURE 34. Joint Transmitter Building, Eniwetok Island

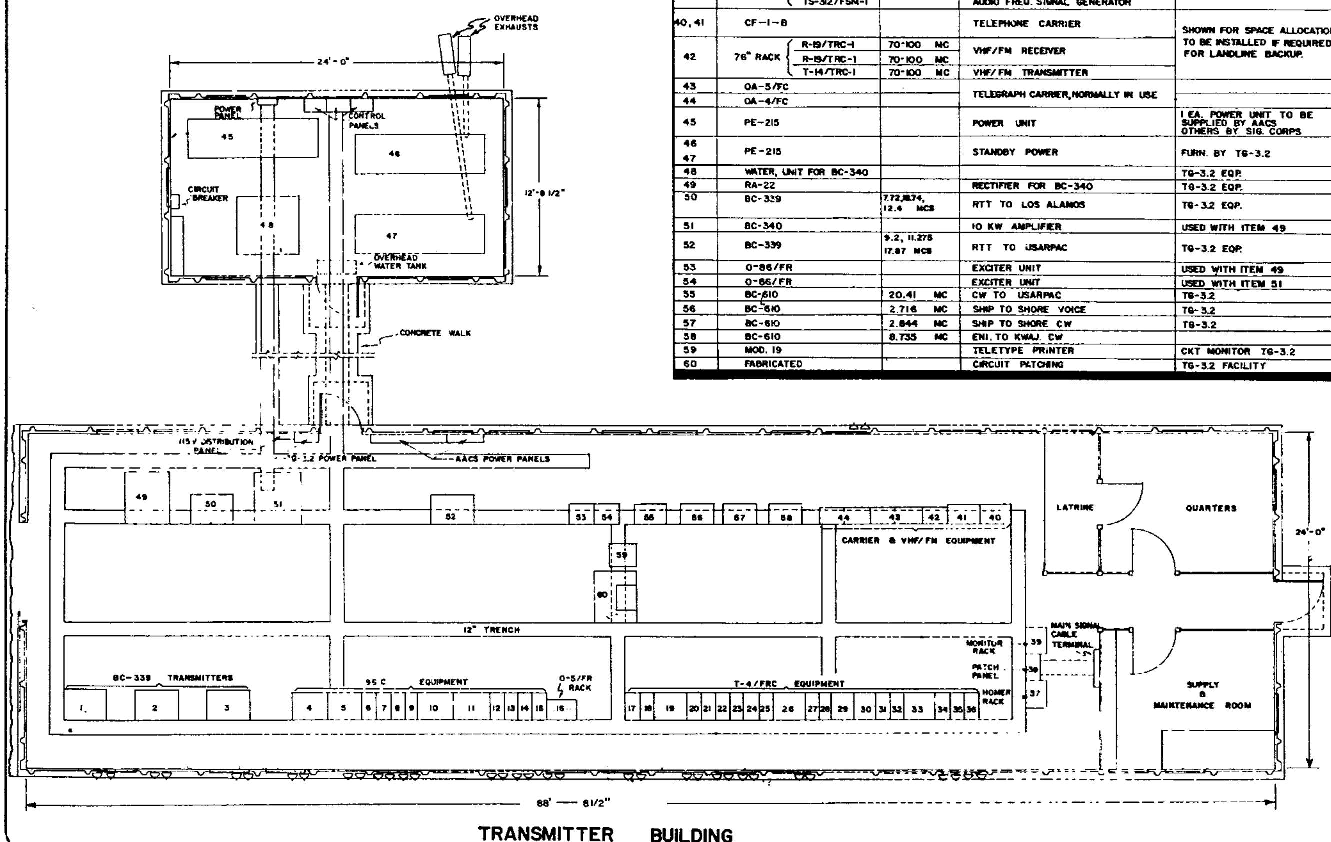
EQUIPMENT DATA

EQUIP NO.	EQUIPMENT TYPE	FREQ.	APPLICATION	REMARKS
1	3 EA. BC-339	9180 KC	CW MANUAL WEATHER NET	
2		12070 KC		
3		6050 KC		
4	MD-69/FRT (WILCOX 50A)		MODULATOR	
5	PP-219/FRT (WILCOX 36A)		POWER SUPPLY	
6	4 EA. T-158B/FRT WILCOX 96C	9062.5 KC	KWAJALEIN RADIOTELETYPE CIRCUIT	
7		HF	STANDBY	
8		9630 KC	KWAJALEIN VOICE CIRCUIT	
9		5742.5 KC	KWAJALEIN RADIOTELETYPE CIRCUIT	
10	MD-69/FRT (WILCOX 50A)		MODULATOR	
11	PP-219/FRT (WILCOX 36A)		POWER SUPPLY	
12	4 EA. T-158B/FRT (WILCOX 96C)	4MC. PROJ.	KWAJALEIN RADIOTELETYPE CIRCUIT	
13		4MC. PROJ.	KWAJALEIN VOICE CIRCUIT	
14		HF	STANDBY	
15		6830 KC	KWAJALEIN VOICE CIRCUIT	
16	76" RACK W/4 EA. O-5/FR		KWAJALEIN RADIOTELETYPE CIRCUITS	
17	T-4/FRC	6430 KC	AIR ROUTE CW GROUND/AIR	
18	MD-1/FRC		MODULATOR	
19	PP-1/FRC		POWER SUPPLY	
20	5 EA T-4/FRC	7685 KC	WEATHER RECONNAISSANCE G/A	
21		HF	STANDBY	
22		8280 KC	AIR DISTRESS	
23		8280 KC	AIR DISTRESS	
24		4330 KC	WEATHER RECONNAISSANCE G/A	

EQUIP NO.	EQUIPMENT TYPE	FREQ.	APPLICATION	REMARKS
25	MD-1/FRC		MODULATOR	
26	PP-1/FRC		POWER SUPPLY	
27	T-4/FRC	7870 KC	AIR ROUTE CW GROUND/AIR	
28	T-4/FRC	HF	STANDBY	
29	T-5/FRC	345 KC	HOMING BEACON STANBY	
30	T-5/FRC	345 KC	HOMING BEACON	
31	T-4/FRC	HF	STANDBY	
32	MD-1/FRC		MODULATOR	
33	PP-1/FRC		POWER SUPPLY	
34		HF	STANDBY	
35	3 EA. T-4/FRC	3450 KC	AIR ROUTE CW GHOUND/AIR	
36		14450 KC	WEATHER RECONNAISSANCE G/A	
37	76" RACK: O-37/FRT		HOMING BEACON TONE OSCILLATOR	
	O-37/FRT		STANDBY TONE OSCILLATOR,	
	WILSON # 22		HOMING BEACON IDENTIFICATION KEYER	
	WILSON 22		STANDBY KEYER	
	RELAY PANEL		HOMING BEACON MODULATION CONTROL	
	RELAY PANEL		STANDBY CONTROL PANEL	
	EE-8		TELEPHONE TO RECEIVER STATION	
38	BD-74H		MAIN STATION PATCH PANEL	
39	76" RACK: BC-794, RA-74-C		MONITOR RECEIVER & POWER SUPPLY	
	BC-1031-B		PANORAMIC ADAPTOR-VISUAL MONITOR	
	BC-221, RA-133		FREQ. METER & POWER SUPPLY	
	I-134		OSCILLOSCOPE	
	TS-32/FSM-1		AUDIO FREQ. SIGNAL GENERATOR	
40, 41	CF-1-B		TELEPHONE CARRIER	SHOWN FOR SPACE ALLOCATION TO BE INSTALLED IF REQUIRED FOR LANDLINE BACKUP.
42	76" RACK: R-19/TRC-1	70-100 MC	VHF/FM RECEIVER	
	R-19/TRC-1	70-100 MC		
	T-14/TRC-1	70-100 MC	VHF/FM TRANSMITTER	
43	OA-5/FC		TELEGRAPH CARRIER, NORMALLY IN USE	
44	OA-4/FC			
45	PE-215		POWER UNIT	1 EA. POWER UNIT TO BE SUPPLIED BY AACS OTHERS BY SIG. CORPS
46, 47	PE-215		STANDBY POWER	FURN. BY TG-3.2
48	WATER, UNIT FOR BC-340			TG-3.2 EQP.
49	RA-22		RECTIFIER FOR BC-340	TG-3.2 EQP.
50	BC-339	7.72, 18.74, 12.4 MCS	RTT TO LOS ALAMOS	TG-3.2 EQP.
51	BC-340		10 KW AMPLIFIER	USED WITH ITEM 49
52	BC-339	9.2, 11.275, 17.87 MCS	RTT TO USARPAC	TG-3.2 EQP.
53	O-86/FR		EXCITER UNIT	USED WITH ITEM 49
54	O-86/FR		EXCITER UNIT	USED WITH ITEM 51
55	BC-610	20.41 MC	CW TO USARPAC	TG-3.2
56	BC-610	2.716 MC	SHIP TO SHORE VOICE	TG-3.2
57	BC-610	2.844 MC	SHIP TO SHORE CW	TG-3.2
58	BC-610	8.735 MC	ENI. TO KWAJ. CW	
59	MOD. 19		TELETYPE PRINTER	CKT MONITOR TG-3.2
60	FABRICATED		CIRCUIT PATCHING	TG-3.2 FACILITY

CHANGE RECORD

NO.	REMARKS	DATE	BY
A	REDRAWN	7 JUL.'50	
B	REDRAWN	12 DEC.'50	
C			
D			



TRANSMITTER BUILDING

ENIWETOK ISLAND
JOINT TRANSMITTER STATION
FLOOR PLAN & EQUIPMENT LAYOUT

DATA	DRAWN	DATE 20 DEC. 1950
CHECKED	APPROVED	SCALE 1/4" = 1'-0"
HEADQUARTERS' JTF-3 J-5 DIV.		PROJECT GREENHOUSE

FIGURE 35

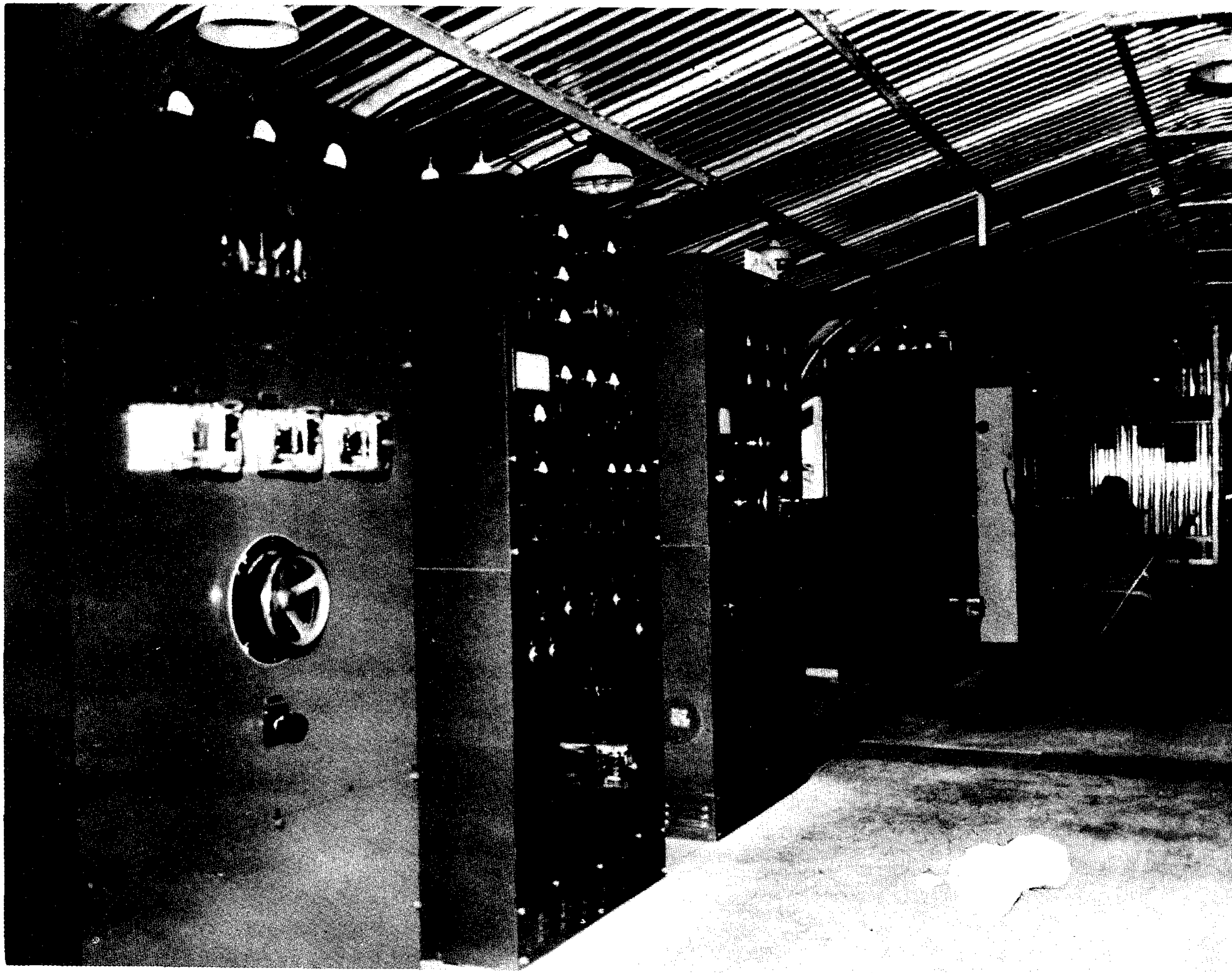


FIGURE 35A. Interior Joint Transmitter Building Showing TG 3.2 Transmitters

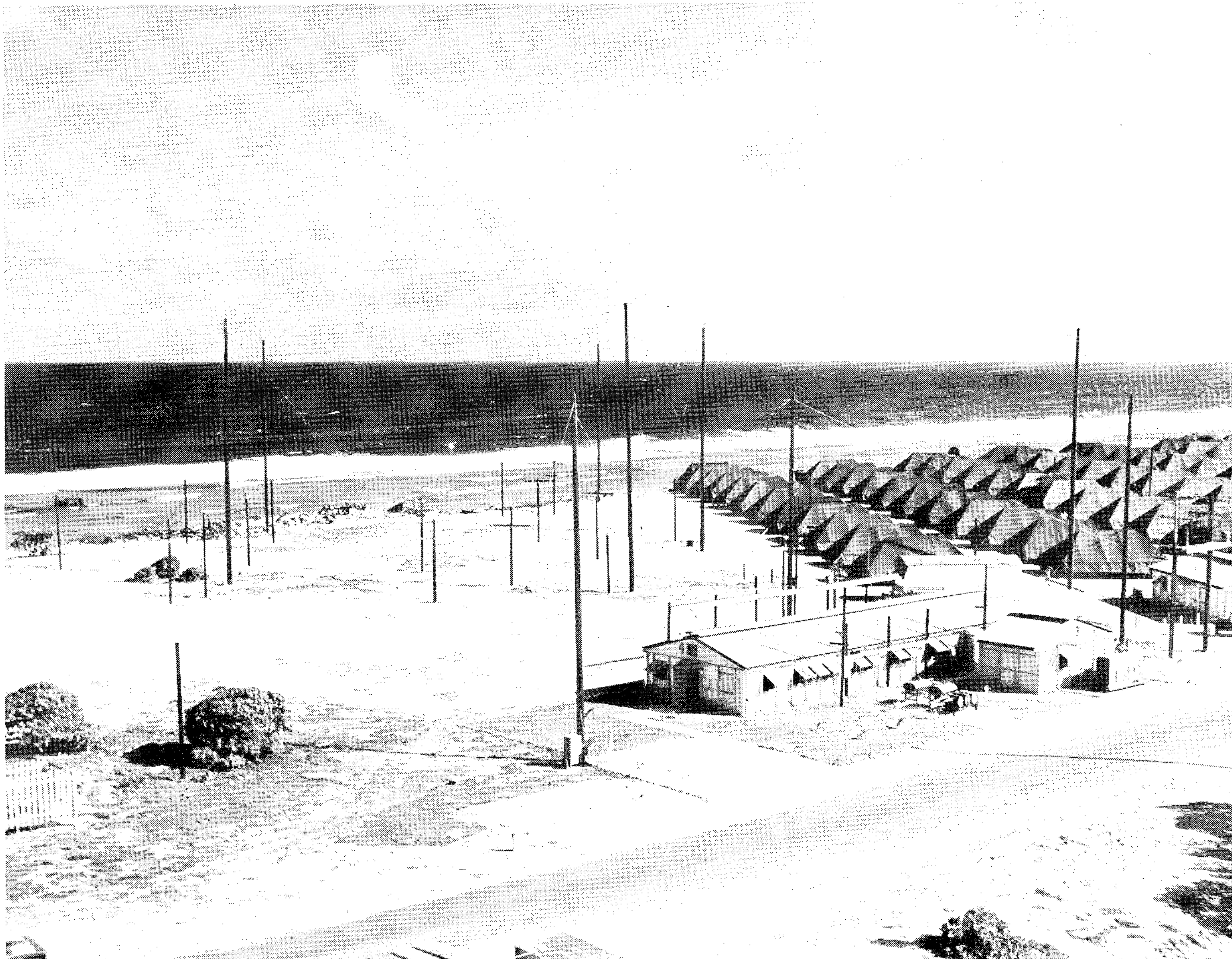
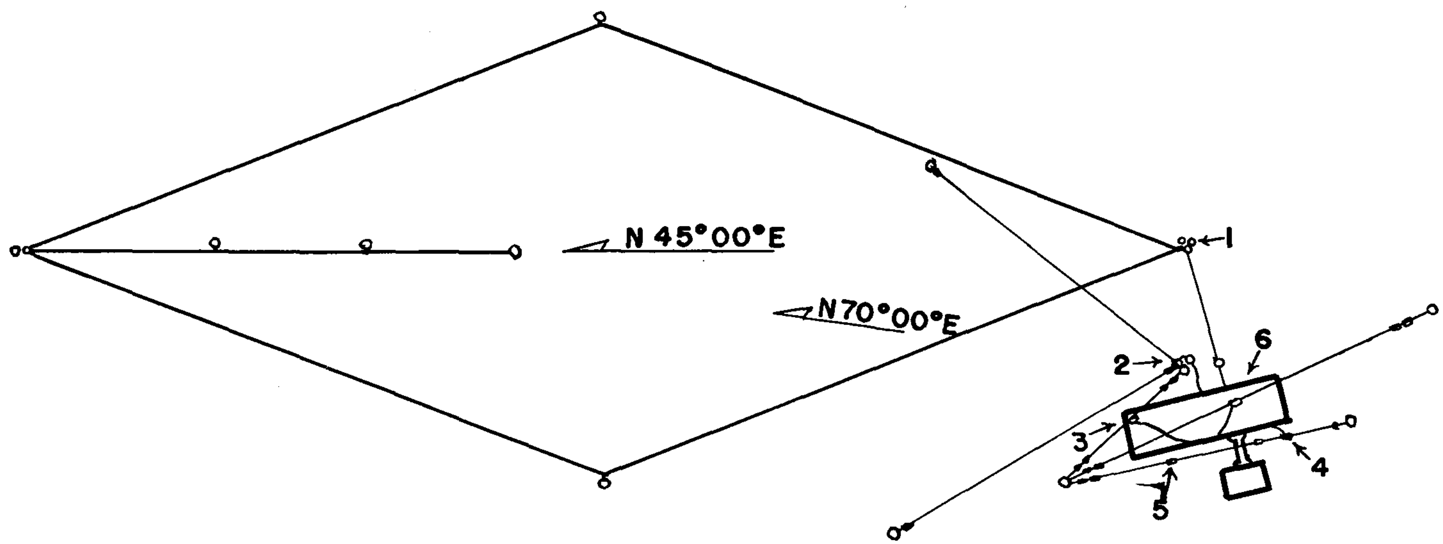


FIGURE 36. Joint Transmitter Station Antenna Farm, Eniwetok Island

ANTENNA FARM



1- ROMBIC - LOS ALOMOS
2- "V" BEAM - OAHO
3- DOUBLET - OAHO 8 MEGS C.W.
4- DOUBLET - OAHO 20 MEGS C.W.
5- DOUBLET - KWAJ 6 MEGS C.W.
6- DOUBLET - SHIP TO SHORE

FIGURE 36A. TG 3.2 Transmitting Antenna Layout

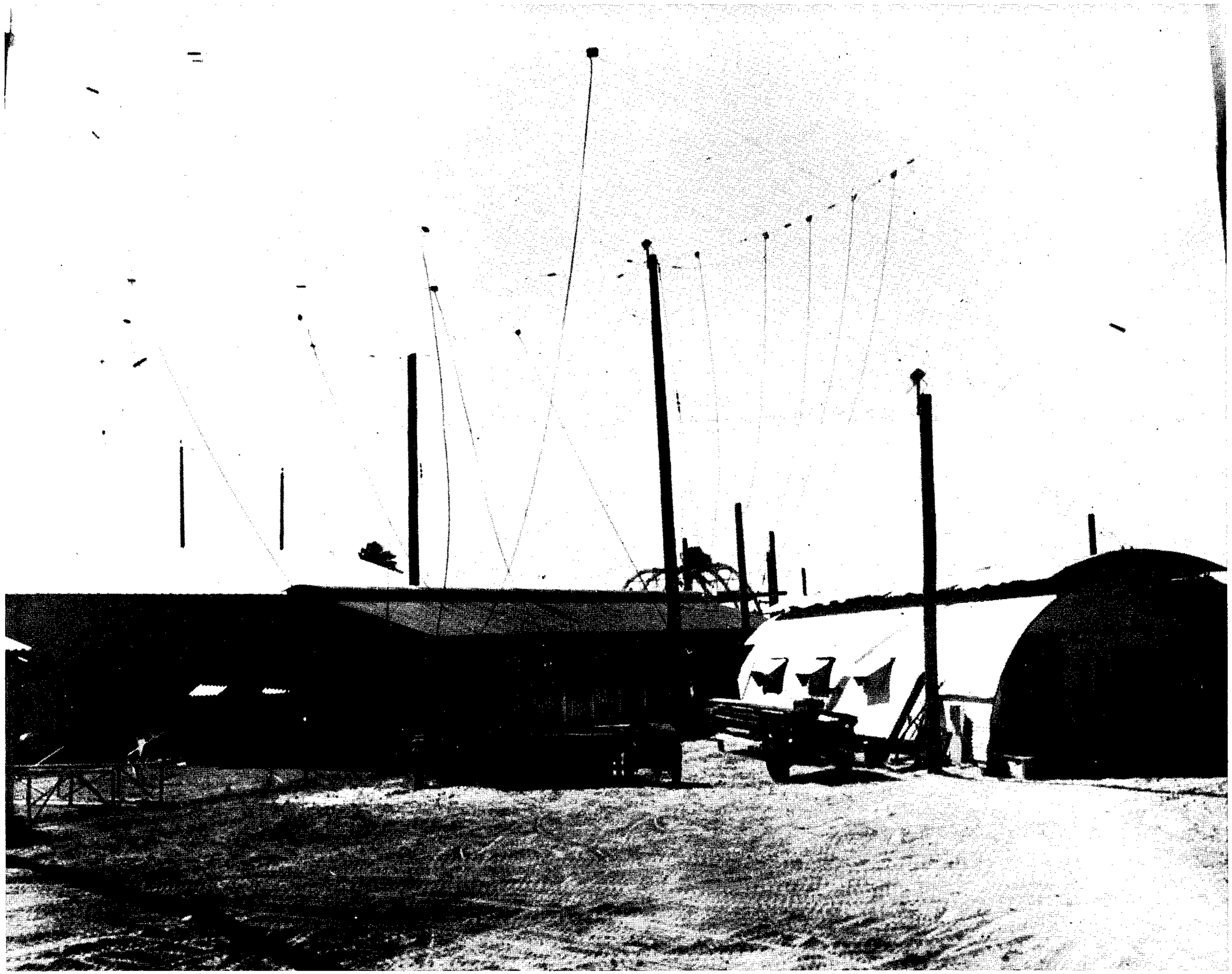


FIGURE 37. Receiving Station, Building #85, Eniwetok Island

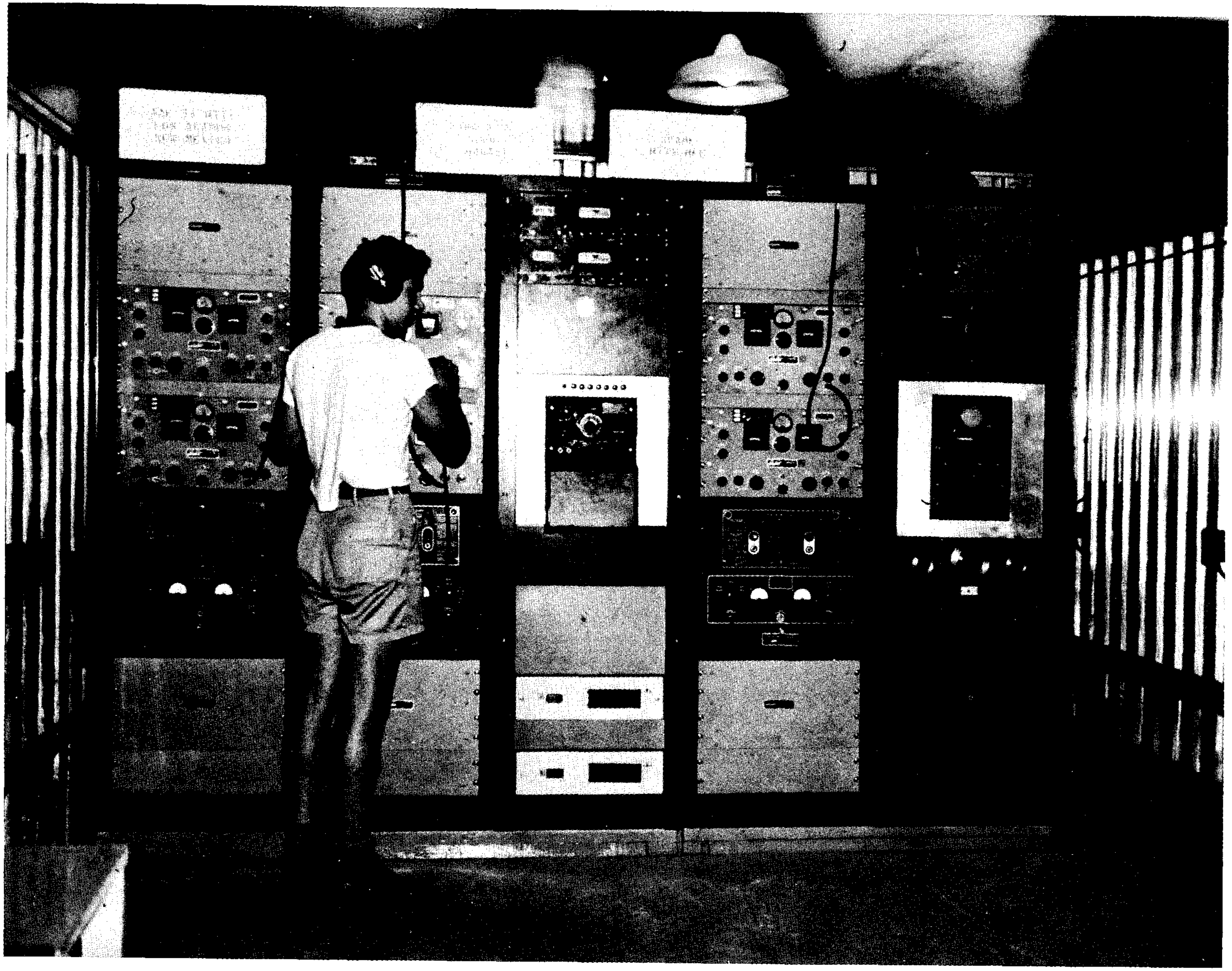


FIGURE 38. Diversity Receiving Equipment Building #85, Eniwetok Island

FIGURE 39. Diversity Converter Bays, Patch-Pannel and Test Position, Eniwetok Island

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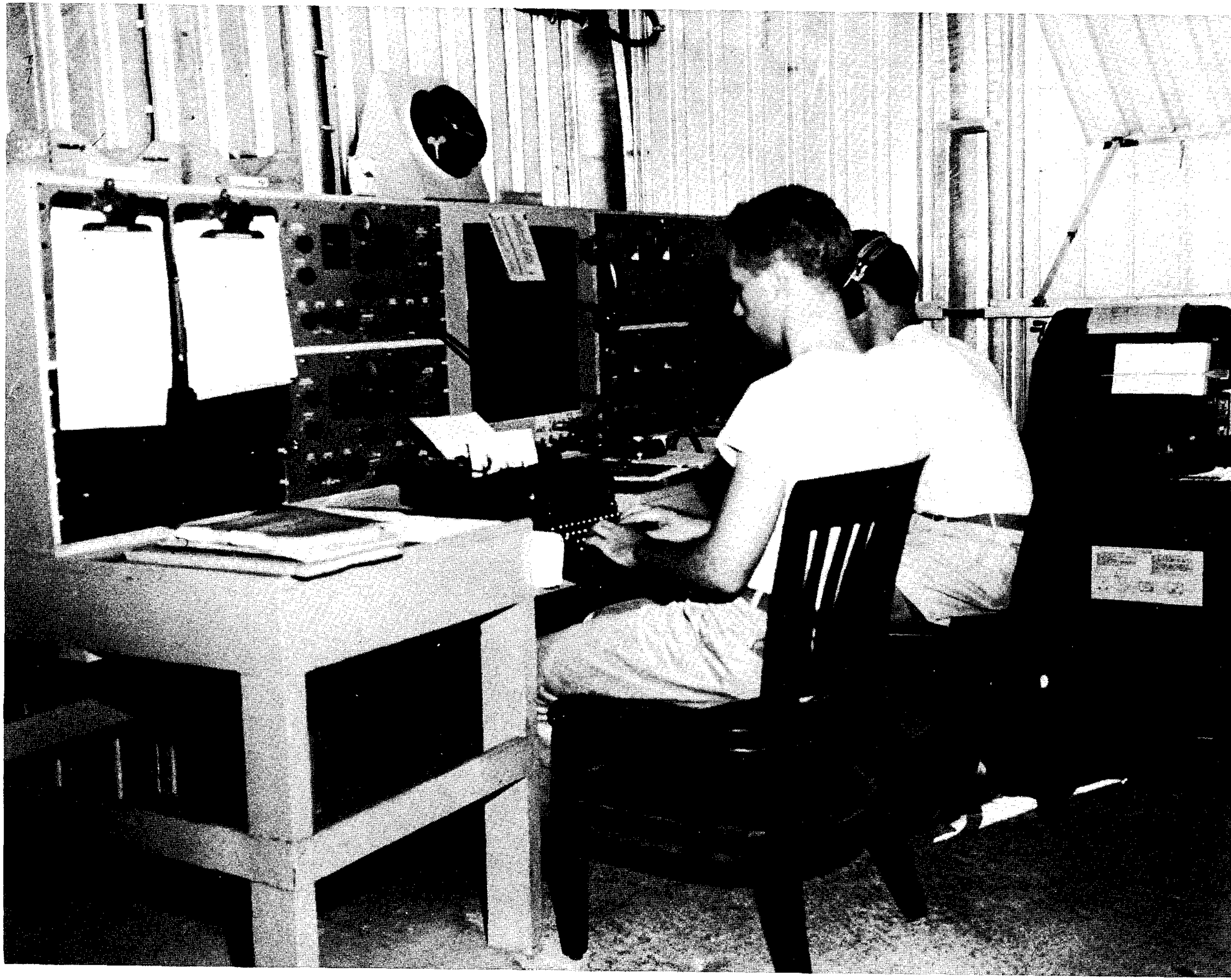

FIGURE 40. Manual Operator Positions, Eniwetok Receiver Station

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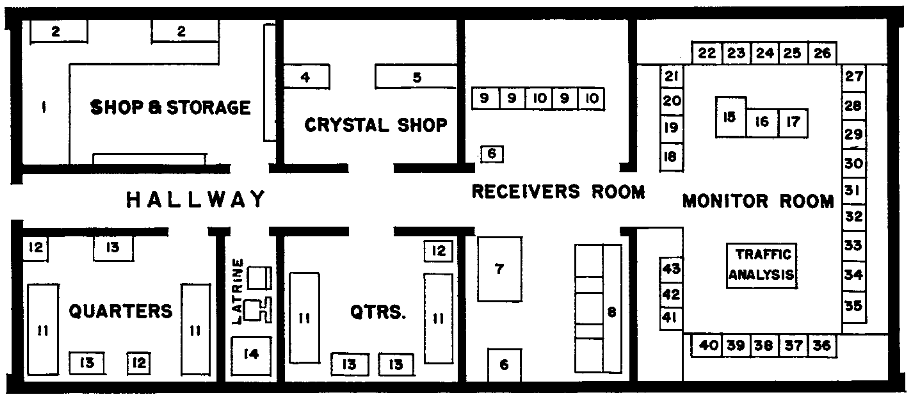

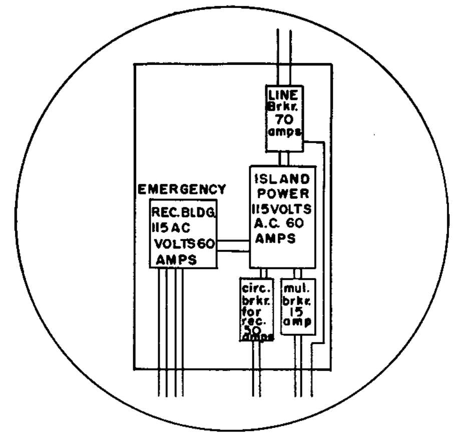

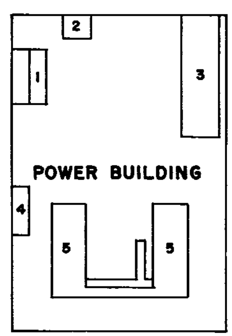

RECEIVERS BUILDING

1. WORK BENCH
2. SHELFS
3. STORAGE BINS
4. CRYSTAL GRINDING SET
5. CRYSTAL TEST SET
6. TELETYPEWRITERS
7. DESK
8. CW & PHONE OPERATING POSITION TABLE
9. AM / FRR 12
10. CV-31A / TRA-7
11. BUNKS
12. WALL LOCKERS
13. FOOT LOCKERS
14. SHOWER

17. R-4 RECORDER MOUNTED ABOVE PATCHBOARD
16. 15 CHANNEL STANCIL - HOFFMAN RECORDER
15. DUAL 15 CHANNEL STANCIL - HOFFMAN RECORDER
18. Thru 37. 2 EACH, RACK MOUNTED RECEIVERS
38. Thru 43. BENCH MOUNTED RECEIVERS

POWER BUILDING

1. BATTERY RACK
2. TOOL CABINET
3. WORK BENCH
4. METERS & SWITCHES
5. POWER UNITS

FLOOR PLAN
REC & POWER BUILDING

FIGURE 41

[redacted]

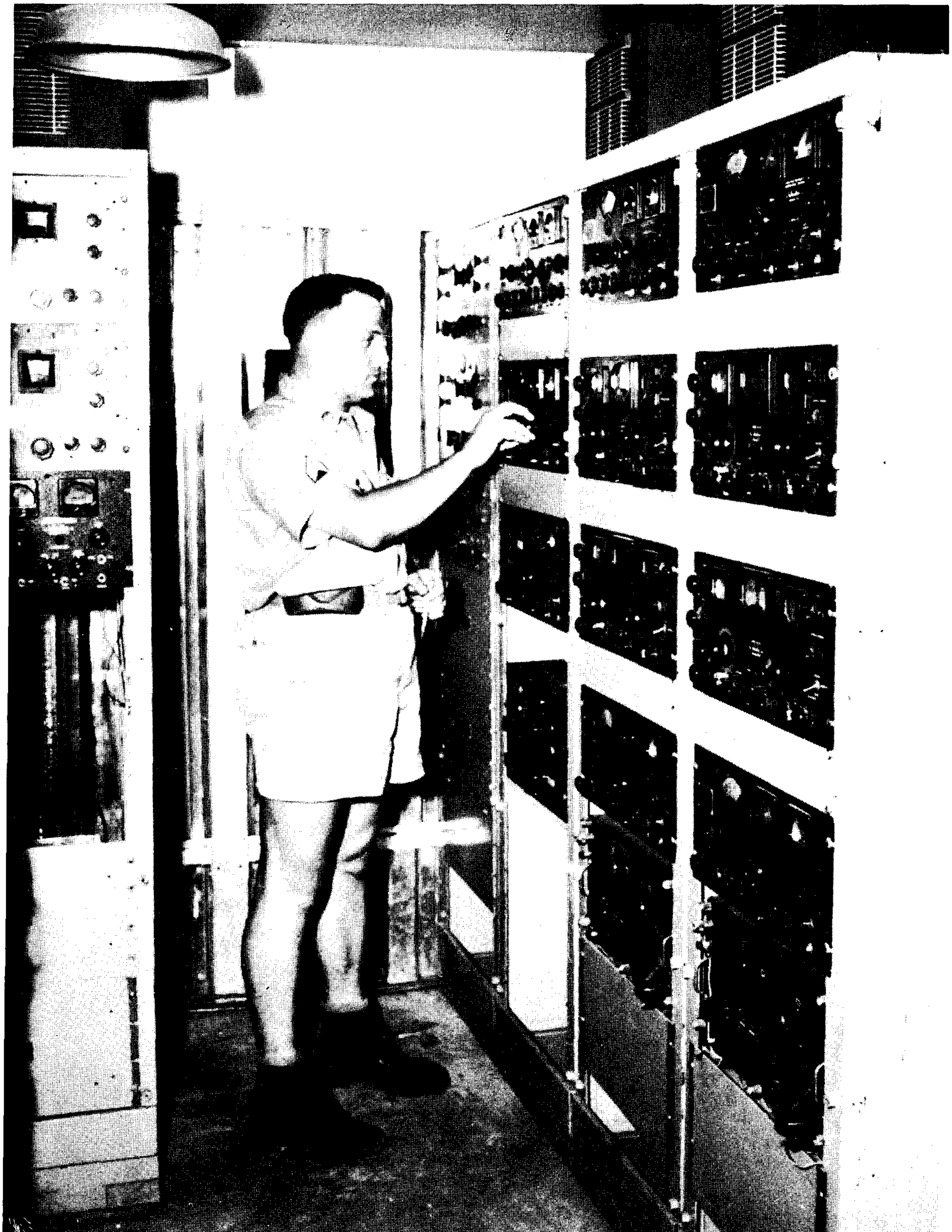

FIGURE 42. Monitor Receiving Equipment, Eniwetok Island Receiver Station

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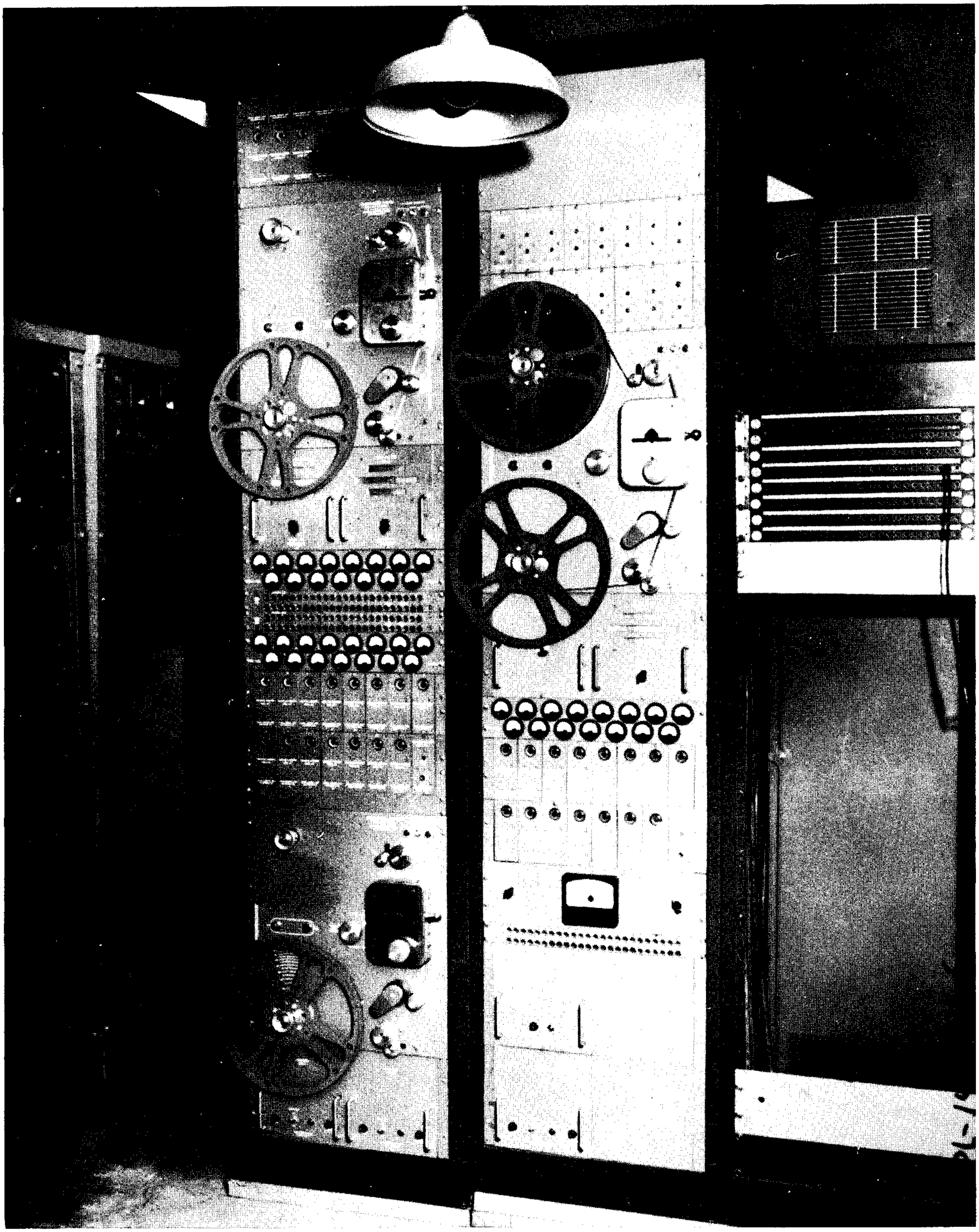

FIGURE 43. 15 Channel Magnetic Tape Recorder, Monitor Room, Eniwetok Receiver Station

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USARPAC, this equipment was returned to Hawaii and upon conclusion of Operation GREENHOUSE similar equipment should be obtained for future operations. An experienced EM is essential if full and satisfactory employment of this equipment is to be made.

(4) The purpose of the maintenance shop in the receiver building was to provide maintenance for equipment installed therein.

(5) The receiving antenna farm included two end on rhombics separated approximately 500 feet apart for diversity reception and oriented in the direction of Los Alamos. By means of a multi-coupler, these antennas were used satisfactorily on both the Los Alamos and the USARPAC radio teletype circuits.

3.1.5.4 Comments and Recommendations

(1) The BC–610 type transmitters have been improved, but still gave trouble when used in close proximity with other equipment susceptible to high level harmonic radiation. Coupling capacitors in excitor section failed. Repeated failures of choke L–4 in power supplies were experienced.

(2) The O–5/FR and O–86/FRT radio-teletype frequency shifters frequently shorted the high voltage winding of the power transformer to ground. This deficiency was corrected by installing heavier transformers.

(3) The radio-teletype receiving equipment (AN/FRR 12 with CV/31/TRA–7 RTT convertor) was a good combination for receiving and converting radio-teletype single-channel signals, but could be improved if an automatic frequency control, such as is used on the AN/FRR–3 receiver was used with it.

(4) The monitoring equipment used during Operation GREENHOUSE was engineered to meet the special requirements of one of the scientific projects. It was also used in the security program and as an aid in solving interference problems.

(5) The receiver building was wired to operate to either of two PE–95 power units installed in the battery charging plant neither of which could carry the total power load of the building. When island power failed it was necessary to limit operation to essential circuits. It was the intention of the J–5 Division to use both emergency power units simultaneously and the building should be so wired before the next operation.

(6) The coral of which the Atoll is formed is porous and does not constitute a good ground. It was necessary to extend copper wire from the transmitter site to the water of the lagoon to obtain a satisfactory ground.

3.1.6 BATTERY CHARGING PLANT

A battery charging plant was provided in Building #84 on Eniwetok, the Receiver Bldg. emergency power plant, and operated by TG 3.2 for the purpose of charging and maintaining storage batteries for radio sets and emergency power units.

3.1.7 TASK FORCE COMMUNICATIONS EQUIPMENT REPAIR FACILITIES

The provision of maintenance for all administrative communications facilities of JTF–3, the maintenance of special service radio equipment and assistance to other task groups in the maintenance of tactical electronic equipment was a TG 3.2 mission. Repair facilities were provided in conjunction with the Joint Transmitter and Receiver Buildings for the purpose of performing field maintenance to equipment installed therein. A communications equipment repair shop was provided by TG 3.2 on Eniwetok Island in Building 71 for depot maintenance of fixed plant equipment and for the maintenance of tactical radio sets and special service radio equipment. This repair shop included: Two 12 foot work benches, two bins for spare parts, sufficient storage space, a test panel consisting of two LS–3 speakers, one X–208 signal generator, two X–176 volt-ohm meters and one voltage regulator. Due to space limitations facilities were not provided on Parry Island for storage of spare parts and maintenance of JTF–3 communications. This proved to be somewhat of a handicap in that sets had to be removed to Eniwetok on a replacement basis for testing and repair.

3.1.8 SPECIAL SERVICE RADIO BROADCAST FACILITIES

3.1.8.1 The Signal Officer of TG 3.2 was assigned the mission of installation and maintenance of a special service radio broadcast station on Eniwetok Island. A Gates 250 watt

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broadcast transmitter with associated turntable and studio equipment was provided by AFRS and installed in a building constructed by the Communications Detachment, 7127th AU at the base of the projection booth of the Starlight Theater on Eniwetok in September of 1950. The site was selected to facilitate the pick-up of live talent stage shows.

3.1.8.2 The original equipment provided by AFRS arrived at Eniwetok in very poor condition and after repeated breakdowns, the transmitter was replaced in January 1951, with a late model Gates transmitter and doublet antenna that would meet all FCC requirements.

3.1.8.3 During the operational phase of Operation GREENHOUSE, it was necessary to silence the homing beacon of the air task group due to electronic interference with drone controls. The special service broadcast station (Station WXLE, operating on 1360 kcs) was operated continuously and used as a homing beacon during operations.

3.1.9 AMATEUR RADIO FACILITIES

3.1.9.1 The installation or operation of amateur radio facilities in the Eniwetok area by any individual including licensed amateur operators was forbidden during Operation GREENHOUSE.

3.1.9.2 The mission of the Signal Officer of TG 3.2 included the operation of a MARS station for the passage of cleared CW notes for the benefit of all elements of the task force. Equipment consisting of a Collins 32V2 transmitter and receiving equipment was available for this purpose, however, operating personnel was not available and the station was not established. It is anticipated that this station will be established and operated by the Garrison Signal Detachment and be available for use during subsequent operations.

3.1.10 LORAN FACILITIES

3.1.10.1 In February of 1950, the Coast Guard's plans for LORAN coverage in the Pacific area were reviewed and a recommendation was made to provide an additional chain to supplement the existing LORAN facilities with a station at Eniwetok and slave stations at Wake and Kwajalein in order that JTF-3's overall navigational requirements might be more satisfactory. Space on Eniwetok Island north of the joint transmitting antenna farm was assigned to LORAN Station. The Coast Guard asked for additional space on Eniwetok Island for installation of a monitor station and the removal of the Service Club due to anticipated interference from electrical equipment which was installed in the Service Club. The monitor station was installed on Parry Island. However, experience proved that this installation was not required, and this equipment probably will be moved to the Eniwetok Station to provide a means of monitoring by the Watch Supervisor independent of the Timer Room. The Loran Station did not cause any interference with JTF-3 electronic facilities. It has a small communications requirement for communications with Kwajalein and Wake Islands and with the 14th Coast Guard District in Hawaii. This can be provided by normal administrative radio service.

3.1.10.2 Over and above normal navigational utility to aircraft operating in the Eniwetok area, the LORAN system was the chief means of positioning Weather Reconnaissance Units. Long range plans of the United States Coast Guard call for the elimination of the southern chain LORAN with slave stations at BIKATI and MAJURO, and Master Station at Kwajalein. This chain provides the only coverage south of Kwajalein and during most of the day-light hours the transmissions from WAKE Island cannot be read in the southern area. In the event of a subsequent operation at Eniwetok, it is recommended that prompt action be taken to have the United States Coast Guard of the USAF install mobile LORAN equipment on Kwajalein, Bikati, and Majuro, using charts for the southern chain which is being discontinued as a permanent installation.

3.2 Joint Task Force Operational Communications

3.2.1 Communications facilities were provided in the Hq, JTF-3 Command Post (Equipment layout drawing, Fig. 44) and in the Hq, JTF-3, J-3 Operations Center (Equipment layout drawing, Fig. 45) to effect coordination and control of all activities preparatory to, during and immediately following detonation

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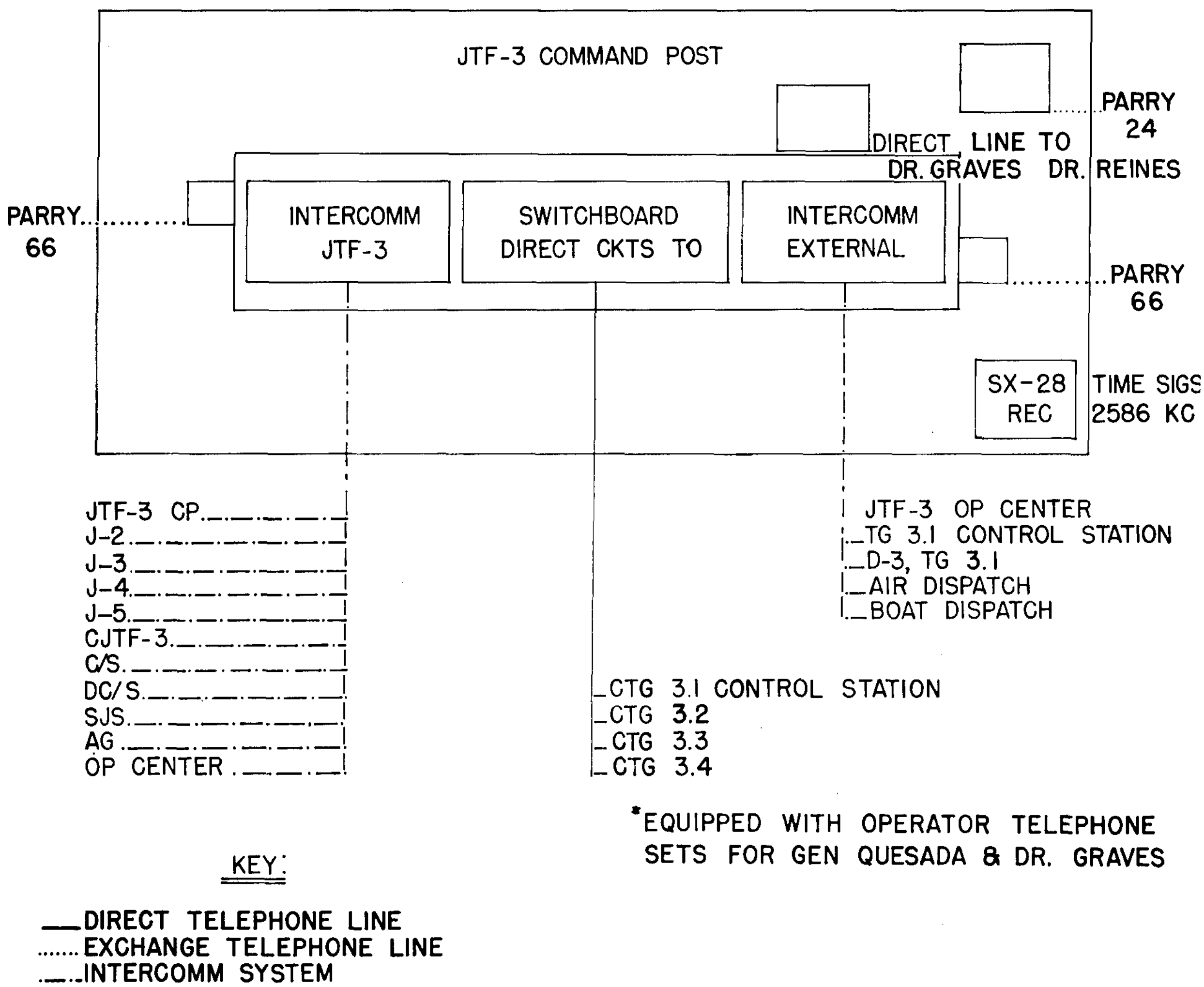

COMMUNICATION FACILITIES,
HQ JTF-3 COMMAND POST

FIGURE 44

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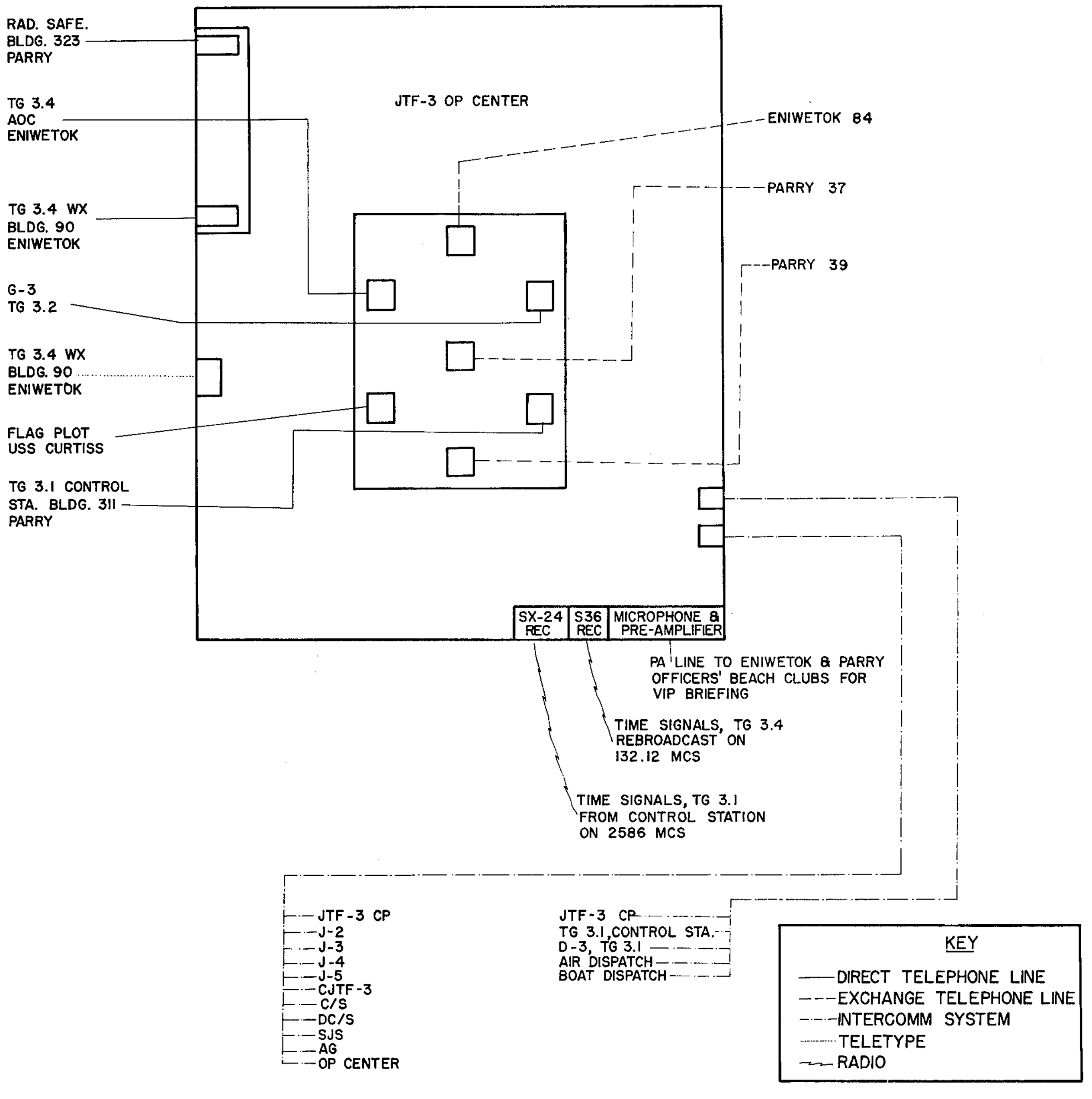

COMMUNICATIONS FACILITIES, HQ JTF-3 OPERATIONS CONTROL CENTER

FIGURE 45

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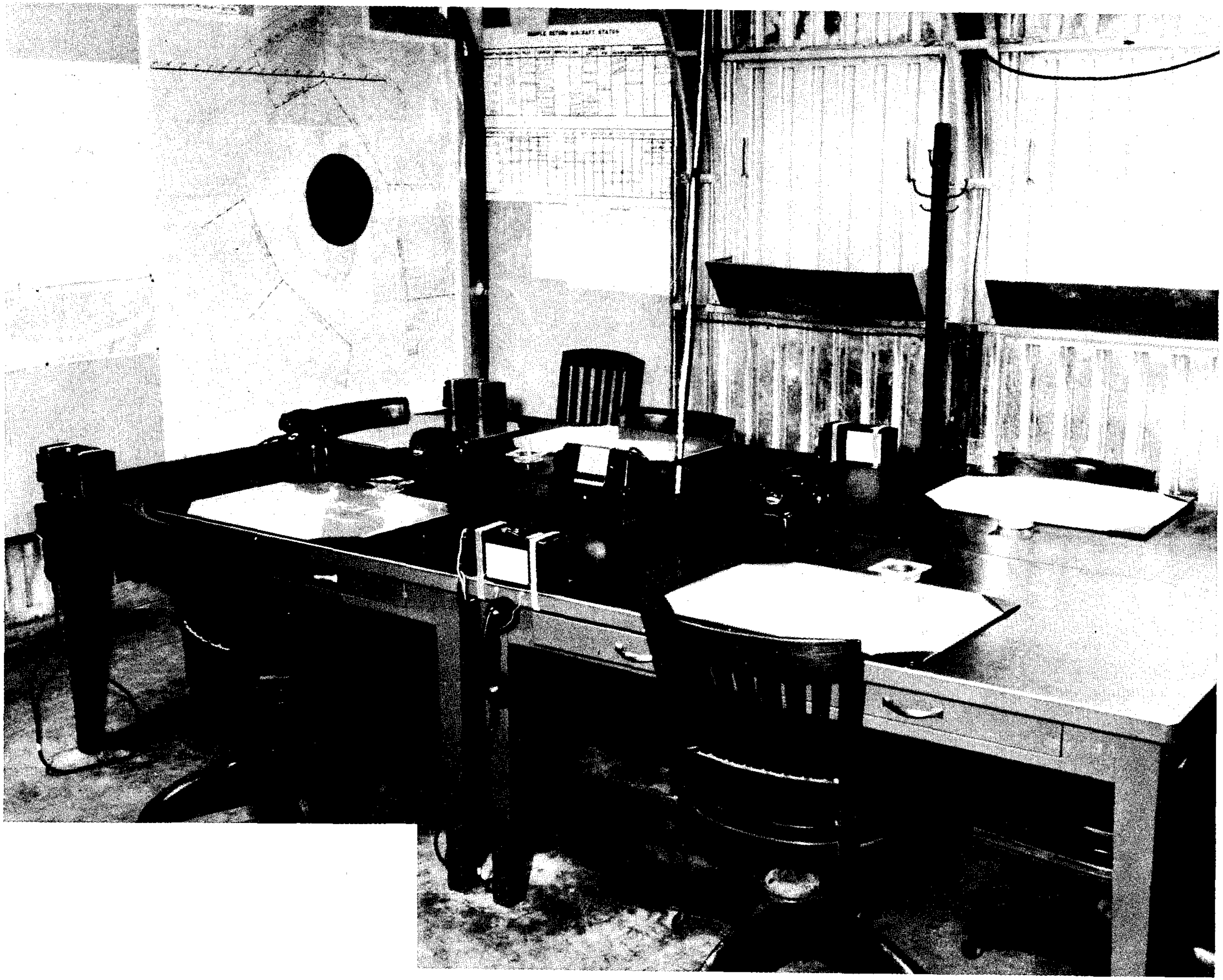

FIGURE 45A. Showing Communications Facilities Installed on Army, Navy, Air and Scientific Desks in Hqs, JTF-3, Operations Center

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of weapons when radiological safety checks were being made. Provision was also made for providing time signals and briefing official observers who were located at the Parry and Eniwetok Officer's beach clubs at shot time.

3.2.2 Voice time and warning signals for the Task Force were a responsibility of Task Group 3.1. These voice signals were broadcast by the "TALKER" from the TG 3.1 control tower prior to each shot at minus 60, 45, 30, 15, 10, 5, 4, 3, 2, 1 minutes and minus 45, 30, 25, 20, 15, 10 to 0 seconds. These signals were transmitted on 2586 kc by means of an SCR–543 radio set installed in the TG 3.1 control tower, and they were transmitted simultaneously over a cable pair to the AOC and Hq, TG 3.2, on Eniwetok Island. TG 3.3 and TG 3.4 rebroadcast these time and warning signals to all subordinate units over assigned operational and command voice radio circuits.

3.2.3. Initial communications requirements for the Hq, JTF–3 Command Post and Operations Center were not made known to the Communications Division until December of 1950. Additional requirements continued to develop throughout the operation and for this reason, equipment required for these installations was not available when needed and considerable improvision was necessary, including the local fabrication of a cordless switchboard for installation in the Command Post and adaptation of available equipment to meet operational requirements.

3.2.4 Operational communications facilities were entirely satisfactory, however, the following refinements are recommended:

3.2.4.1 The rearrangement of telephone facilities in the J–3 Operations Center to make the lines from the Parry and Eniwetok exchanges available to each operating position by providing 3-way pick-up keys associated with the telephone instrument at each position.

3.2.4.2 VHF radio back-up was planned for direct wire circuits between Eniwetok and Parry Islands, terminating in the Hq, JTF–3 Command Post and Operations Center. These plans were abandoned in view of a command decision that security of the operation would dictate postponement of a test if the inter-island cable circuits failed. Hence, no back-up provision for these circuits is required.

3.2.4.3 The briefing of official observers required the installation of public address systems at various assembly points, in vehicles and aboard DUKWS. There were numerous requests for tape recording equipment capable of continuous operation up to sixty minutes. It is recommended that public address systems for either or both AC and DC operation and a minimum of two high quality tape recorders be provided for the J–5 Division for the next operation to meet unforeseen requirements as they develop.

3.3 Task Force Communications for Emergency Evacuation

3.3.1 Communications plans in the event of an emergency evacuation of the Eniwetok Atoll prior to completion of Operation GREENHOUSE included:

3.3.1.1 Continued operation of normal communications facilities as long as required to support the evacuation and/or defense of the Atoll.

3.3.1.2 The Hq, JTF–3 and TG 3.1 Command Posts would move aboard the USS CURTISS where CTG 3.3 would provide the necessary shipboard communications to support the evacuation.

3.3.1.3 The Command Post for TG 3.4 would move to Kwajalein.

3.3.1.4 The Command Post for TG 3.2 would move to the USS CABILDO when no longer required on Eniwetok.

3.3.2 While evacuation was not required during Operation GREENHOUSE, it was contemplated and planned for on several occasions, once when it appeared that Typhoon Georgia would move through the area accompanied by a tidal wave that would inundate the Atoll and there was always the possibility of unfavorable radioactive fall-out after each scientific test which might dictate an emergency evacuation. The Communications Officer of a Task Force of the nature of JTF–3 should plan his communications to provide for any emergency including overt acts by an unfriendly power.

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3.4 Task Group 3.1 Communications Facilities

3.4.1 Task Group 3.1 communications facilities consisted of:

3.4.1.1 Contractor boat pool radio nets.

3.4.1.2 Tactical radio nets required by construction and scientific work parties to supplement limited telephone facilities on shot islands.

3.4.1.3 Tactical radio nets to provide required communications for scientific resurvey and radiological safety monitoring personnel upon re-entry to shot islands after detonation of weapons when the telephone system could not be relied upon due to possible physical damage or contamination.

3.4.1.4 Telemetering wire circuits for activating photographic, blast measurement and other instrumentation equipment in proper time phase with detonation of weapon.

3.4.1.5. Time and Warning circuits, both wire and radio.

3.4.1.6 Wire circuits for remote detonation of weapons from the control tower on Parry Island.

3.4.1.7 Operational communications required to coordinate activities immediately prior to, during, and immediately after detonation of weapons.

3.4.1.8 Administrative communications at Los Alamos, consisting of code and message center facilities and the Los Alamos terminal of the Los Alamos-Eniwetok radio teletype circuit.

3.4.2 Holmes & Narver Contractor Communications.

3.4.2.1 Communications required by Holmes & Narver, Contractors, exclusive of local telephone service (Fig. 46) consisted of two radio channels (Circuits J-12 and J-46) for boat pool, load and unload, water taxi and cargo service using SCR-508 and SCR-510 radio sets and one radio channel for working parties using SCR-300 radio sets. Six (6) radio sets SCR-300 were provided for use by construction forces on shot islands when local telephone service was not adequate. The following H&N facilities were radio equipped:

Quantity	Type Boat or Facility
7	LSU
4	YTL
19	LCM
3	Water Taxi
5	DUKW
1	Cable barge
1	Drydock
3	Warehouses
1	Visiting MSTS ships

3.4.2.2 Navy type radio sets TCS were also provided at the air strips on sites B, C, D and E for communications between Holmes and Narver air dispatchers and L-5 and L-13 liaison aircraft of TG 3.4.

3.4.3 Task Unit 3.1.5 (Rad-Safe) Communications (Figure 47).

3.4.3.1 Wire circuit requirements:

3.4.3.1.1 One pair, Rad-Safe Hq, Bldg. #323, Pony, to Bldg. #69 on shot island.

3.4.3.1.2 One pair, Rad-Safe Hq, to Hq, JTF-3 Command Post.

3.4.3.1.3 One Pair, Rad-Safe Hq, to TG 3.1 Control Bldg. #311.

3.4.3.1.4 One pair, Rad-Safe Hq, to Parry boat dispatch.

3.4.3.1.5 One pair, Rad-Safe Hq, to Parry Air Dispatch.

3.4.3.1.6 Two pair, Rad-Safe Hq, to Parry telephone exchange.

3.4.3.1.7 One pair, TU 3.1.5 at JTF-3 Operations Center to Weather Office, Eniwetok.

3.4.3.1.8 Decontamination points on shot islands to local exchange, as required after each shot.

3.4.3.2 Radio Channel Requirements (Circuit J-11).

3.4.3.2.1 Two channels for survey parties using SCR-300 radio sets.

3.4.3.2.2 One channel Rad-Safe Hq to AVR survey party boat, to Bldg. #69 on shot island and to Water Track.

3.4.3.2.3 One channel unattended fall-out recorder station on any island, as required, to Rad-Safe Hq.

3.4.3.3 Equipment requirements:

3.4.3.3.1 14 each EE-8 telephones.

3.4.3.3.2 5 each SCR-508 radio sets.

3.4.3.3.3 20 each SCR-300 radio sets.

3.4.3.3.4 3 each RA-83 rectifiers for use at Bldg. #69, Rad-Safe Hq, and recorder station.

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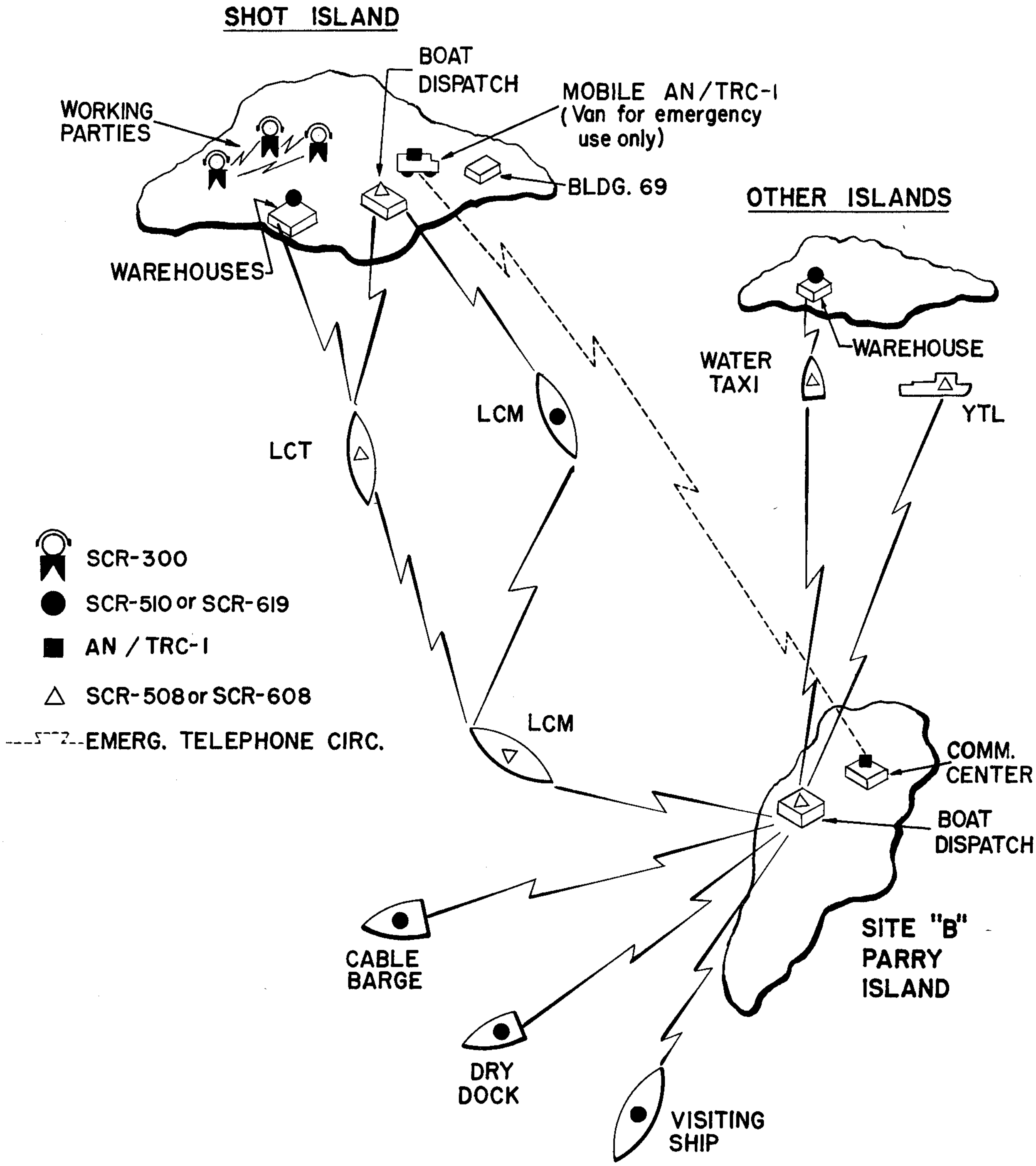

HOLMES & NARVER
SURFACE CRAFT COMMUNICATIONS

FIGURE 46

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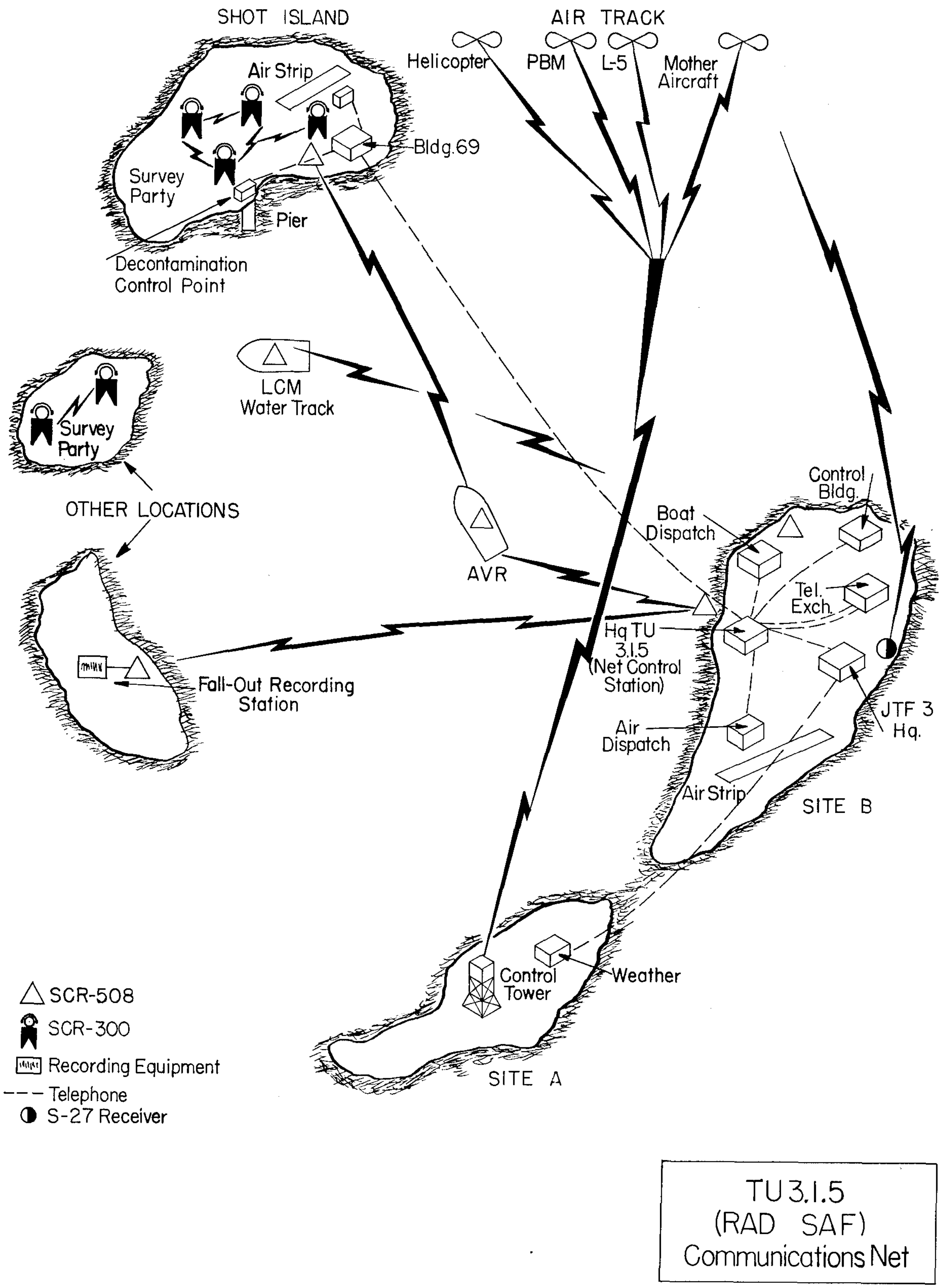

FIGURE 47

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3.4.4 Time and Telemetering, TU 3.1.1 (Figure 48.)

3.4.4.1 Wire circuits requirements.

3.4.4.1.1 All unloaded pairs in the inter-island telephone system north of Parry except cable 2–115 to Japtan and one pair from the cable buoys to the communications center on Parry which was required for teletype service.

3.4.4.1.2 Four unloaded pairs in cable 0–103 between Bldg. 311, Parry and Eniwetok for time signals to stations 775 and TG 3.4 telemetering trailer on Eniwetok.

3.4.4.1.3 One loaded pair from Bldg. #311 Parry to AOC Eniwetok for voice time and warning signals rebroadcast by TG 3.4 to aircraft.

3.4.4.1.4 Other requirements included under TG 3.1 operational circuits.

3.4.4.2 Radio Channel Requirements.

3.4.4.2.1 One channel, Circuit J–3, for working parties using SCR–300 radio sets.

3.4.4.2.2 One channel, circuit J–4, for broadcast of voice time and warning signals using radio set SCR–543.

3.4.4.3 Communications Equipment Requirements.

3.4.4.3.1 Six each EE–8A telephones.

3.4.4.3.2 Ten each radio sets SCR–300.

3.4.4.3.3 Two each radio sets SCR–543.

3.4.5 Project 1.5.2 Communications (Figure 49).

3.4.5.1 Wire Circuits Requirements.

3.4.5.1.1 One pair from shot island to Bldg. #212A, Parry, for telemetering.

3.4.5.1.2 Two pair from Parry exchange to Bldgs. #212A and 212B.

3.4.5.2 Radio Channel Requirements.

3.4.5.2.1 One channel, Circuit J–1, for working parties using SCR–300 radio sets.

3.4.5.2.2 One channel, Circuit J–2, between working parties at winch on shot island and project headquarters, Bldg #212A on Parry Island using TCS radio sets.

3.4.5.3 Communications Equipment Requirements.

3.4.5.3.1 Two each EE–8A telephones.

3.4.5.3.2 Ten each SCR–300 radio sets.

3.4.5.3.3 Two each TCS radio sets.

3.4.5.3.4 One each RA–83 rectifier.

3.4.6 Project 1.6 Communications (Figure 50).

3.4.6.1 Wire circuits requirements.

3.4.6.1.1 One pair Bldg. #229 to J–7 advisory group.

3.4.6.1.2 One pair Bldg. #229 to Parry exchange.

3.4.6.2 Radio Channel Requirement.

3.4.6.2.1 One channel, Circuit J–5, for use of working parties using SCR–300 radio sets

3.4.6.2.2 Entire band from 200 to 230 mcs, Circuit J–6, for telemetering, using special equipment furnished by TU 3.1.1.

3.4.6.3 Communications Equipment Requirements.

3.4.6.3.1 Two each EE–8A telephones.

3.4.6.3.2 Twelve each SCR–300 radio sets.

3.4.7 Task Unit 3.1.2 (Bio-Med) Communications (Figures 51 and 52).

3.4.7.1 Wire Circuit Requirements.

3.4.7.1.1 Seven pair, Japtan subscribers to Parry exchange.

3.4.7.2 Radio Channel Requirements.

3.4.7.2.1 Five channels, Circuit J–7, for a radio net consisting of 12 stations as follows: Command Boat, TG 3.1 Control Bldg. #311, Parry, Hq, TU 3.1.2, Site L, 5 Unk group boats and 4 trunks. For emergency use, JAPTAN and the boats in the net had available one channel assigned to the H&N boat pool.

3.4.7.3 Communications Equipment Requirements.

3.4.7.3.1 Eight SCR–508 radio sets.

3.4.7.3.2 Four SCR–510 radio sets.

3.4.7.3.3 Two RA–83 rectifiers.

3.4.8 Program 3 Communications.

3.4.8.1 Wire Circuits Requirements.

3.4.8.1.1 One pair for USNS MOWER between cable buoy at Engebi and Engebi telephone exchange.

3.4.8.2 Radio Channel Requirements.

3.4.8.2.1 One channel, Circuit J–15, between Hq, TU 3.1.3, Site E, and Program 3 personnel on the MOWER when ship is away from Site E cable buoy this cannel also used for muster reports.

3.4.8.3 Equipment Requirements.

3.4.8.3.1 Two EE–8A telephones.

3.4.8.3.2 Two SCR–508 radio sets located on the USNS MOWER and Hq, TU 3.1.3, Parry.

3.4.8.3.3 One SCR–510 located in Bldg. #335 on Site E.

3.4.8.3.4 Two RA–83 rectifiers.

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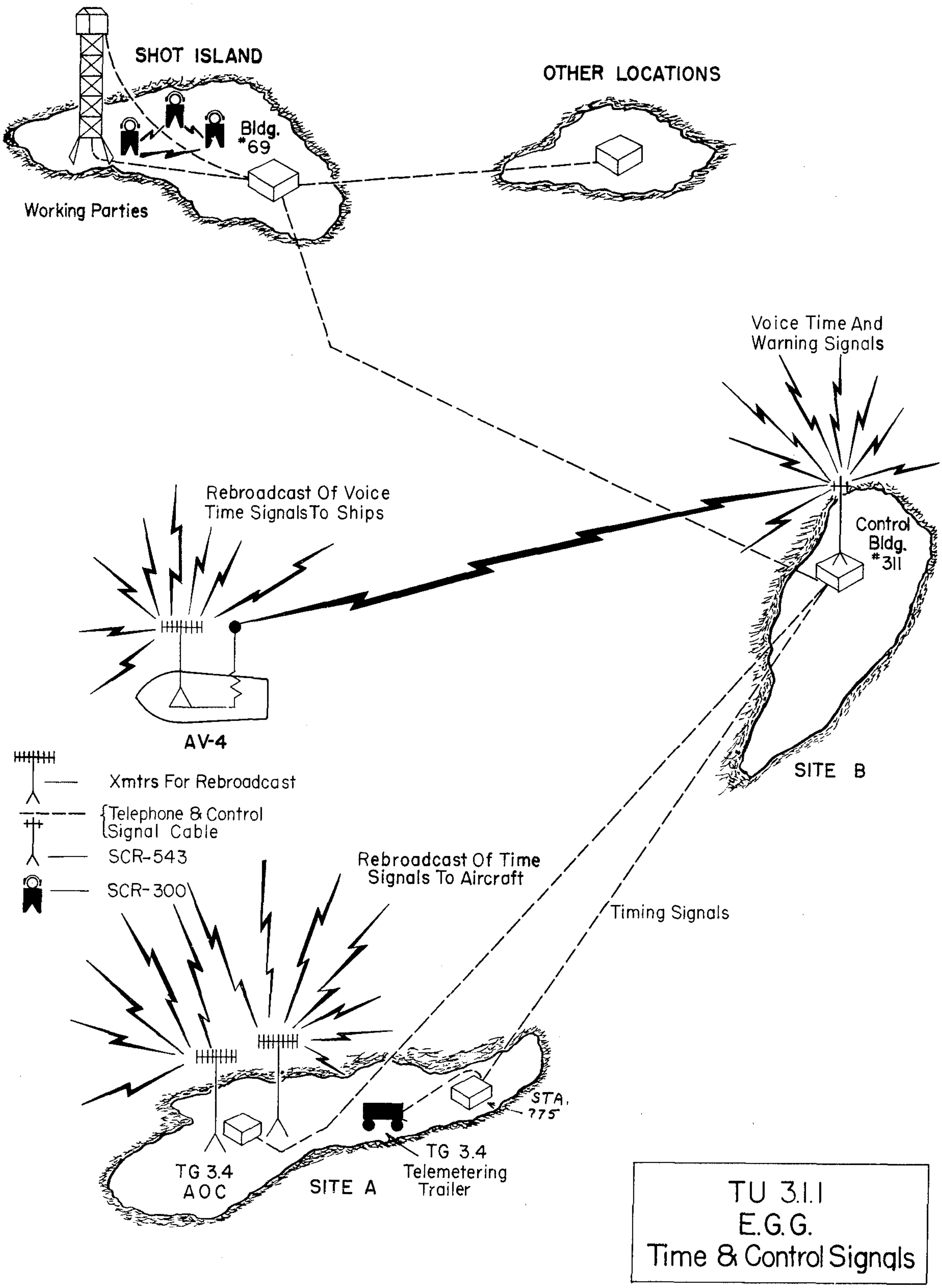

FIGURE 48

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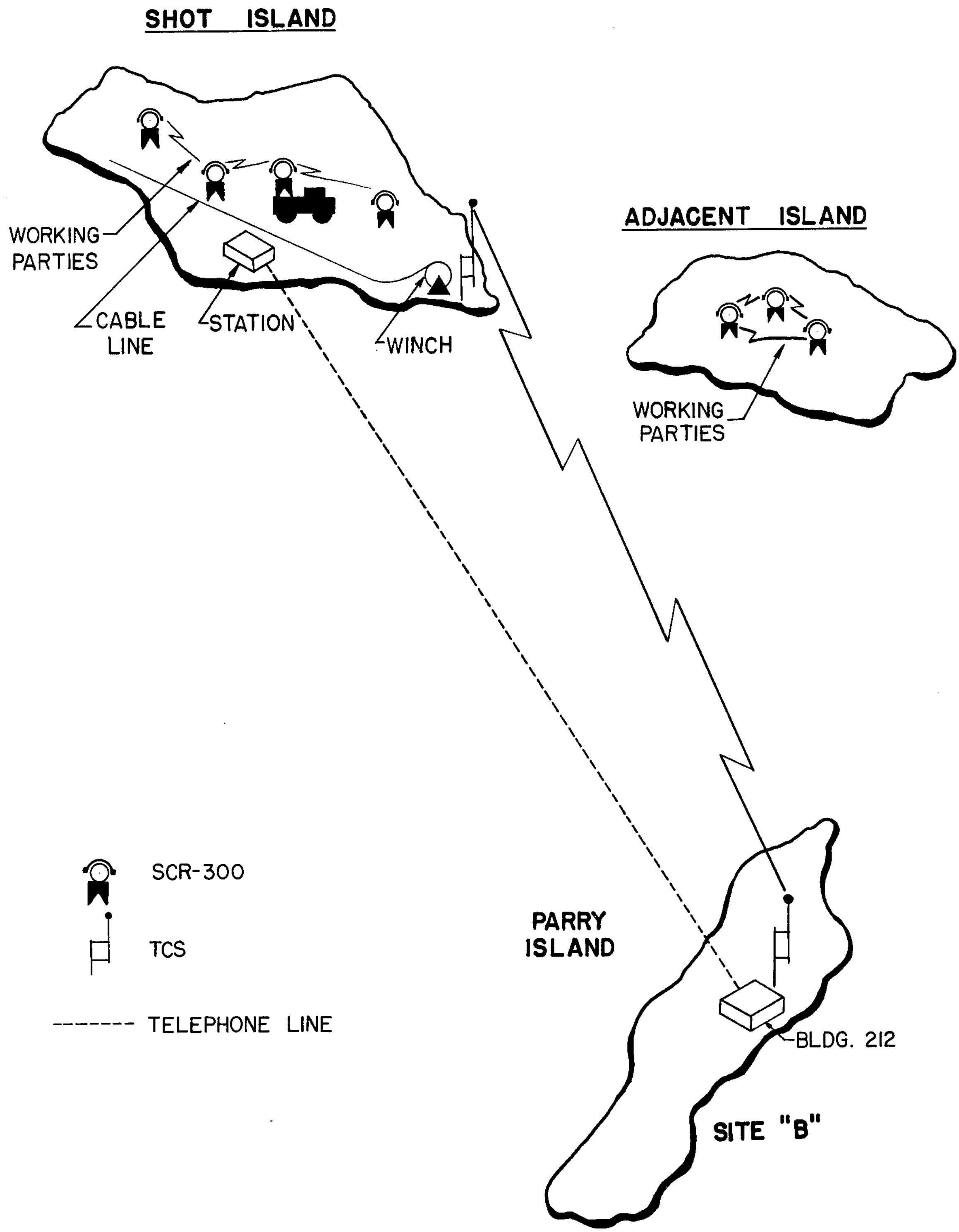

TU 3.1.1
PROJECT 1.5.2

FIGURE 49

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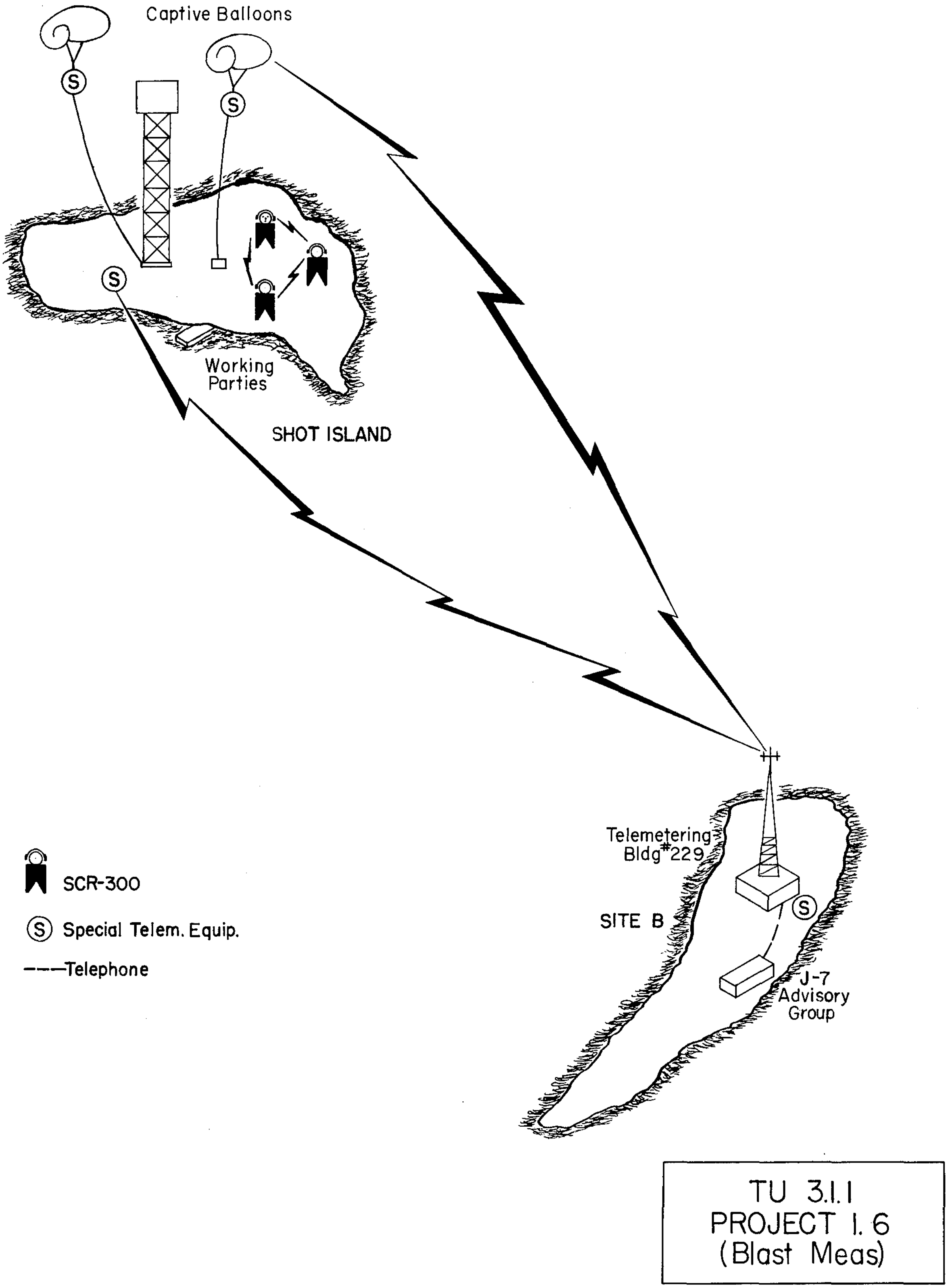

FIGURE 50

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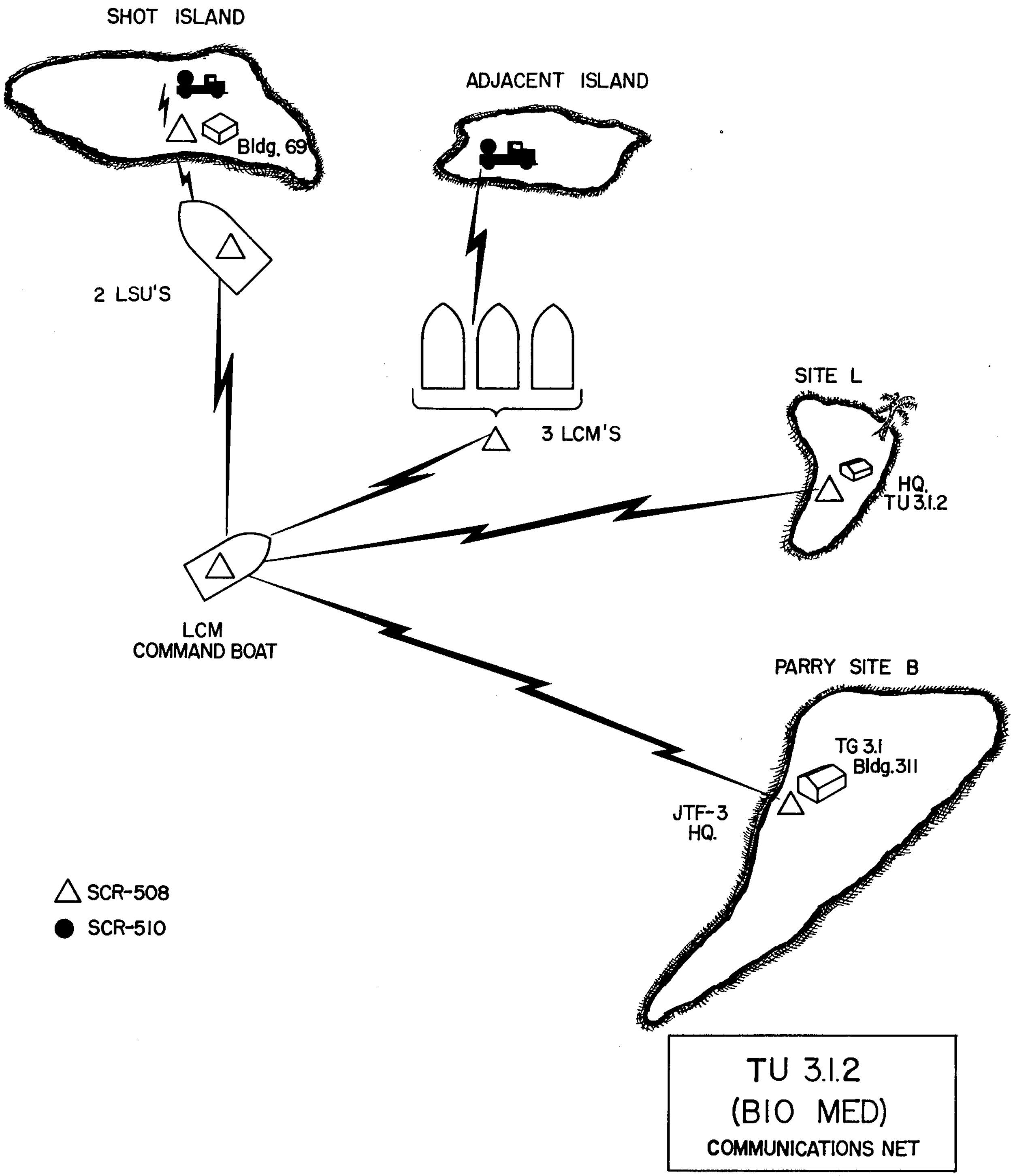

FIGURE 51

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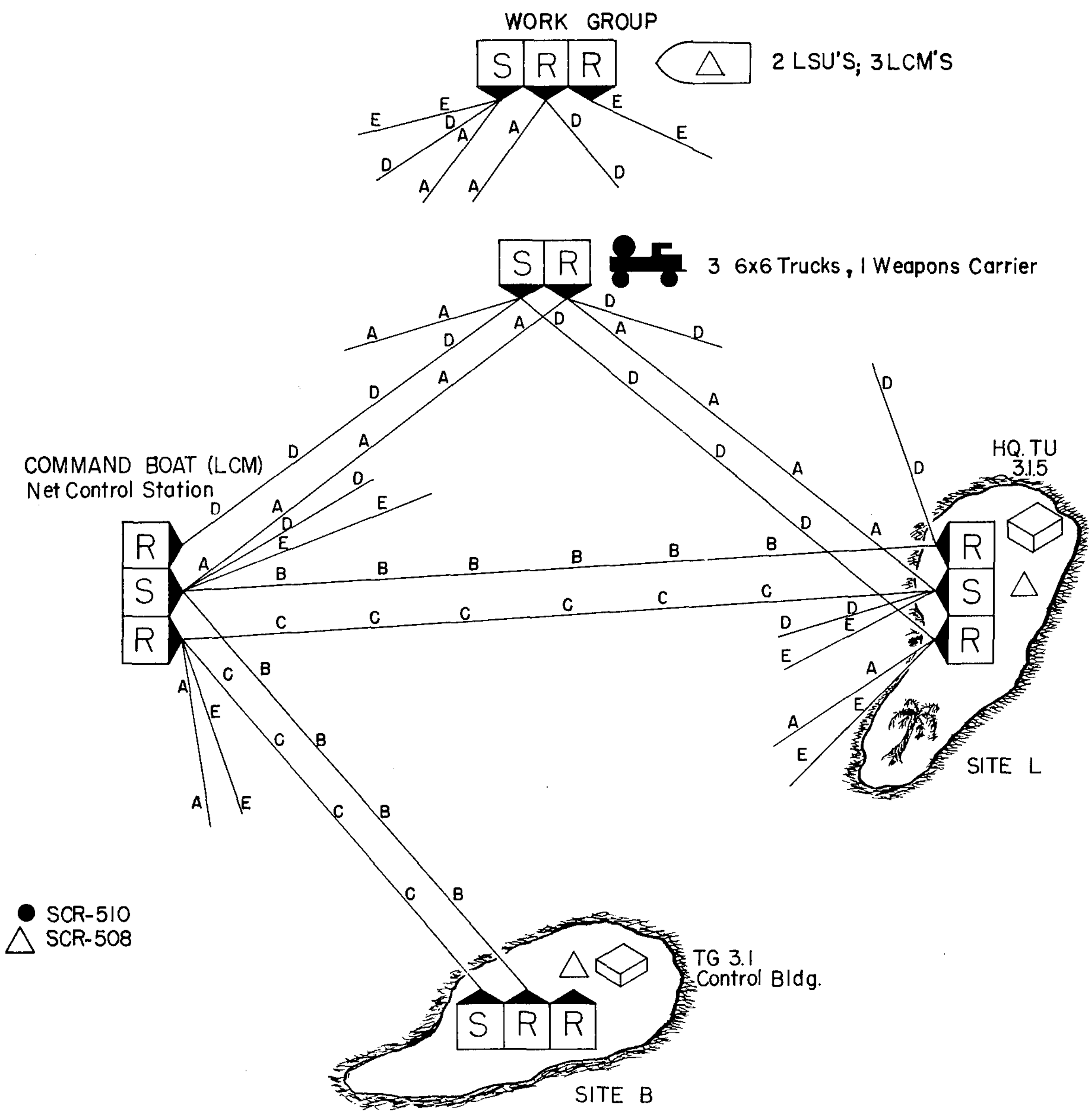

CHANNEL	COMM. BOAT	SITE L	SITE B	WORK GROUP
A	Send- Rec.	Send- Rec.		Send- Guard
B	Send	Guard	Guard	
C	Guards	Send	Send	
D	Send-Guard	Send-Guard		Send-Rec.
E	Send-Rec.	Send-Rec.		Send-Rec.*

* on boats of work group only

TU 3.1.2
(BIO MED)
Frequency Requirments

FIGURE 52

[redacted]

[redacted]

3.4.9 Project 5.2 Communications.

3.4.9.1 Wire Circuit Requirements: None.

3.4.9.2 Radio Channel Requirements.

3.4.9.2.1 One channel for communications between P2V and B–17 aircraft.

3.4.9.2.2 Five channels, 2 mc wide in 160–172 mc band for use between droppable transmitters in the crater area and a P2V and B–17 aircraft.

3.4.9.3 Equipment Requirements.

3.4.9.3.1 Use special radio transmitting and receiving sets furnished TU 3.1.3 and standard sets in aircraft.

3.4.10 Project 6.1 Communications.

3.4.10.1 Wire circuit requirements not available in area of operation.

3.4.10.2 Radio channel requirements.

3.4.10.2.1 One channel for communications between working parties in contaminated aircraft area.

3.4.10.3 Equipment requirements.

3.4.10.3.1 Four SCR–300 radio sets.

3.4.11 TU 3.1.4 Weapons Assembly Communications. (Figure 53.)

3.4.11.1 Wire Circuit Requirements.

3.4.11.1.1 Four pairs from AV–4 at cable buoy to Parry Exchange (when AV–4 is anchored at buoy other than Parry, one pair goes to local exchange). These pairs for telephone service are shared with TG 3.3 except for period shot day minus one to shot day plus one when TG 3.3 has exclusive use of pairs to Parry exchange.

3.4.11.1.2 One pair for teletype service available to TU 3.1.4 from AV–4 to JTF–3 communications center.

3.4.11.1.3 Two unloaded pairs from tower cab to CMR, Bldg. #311, Parry, for telemetering and one pair loaded for telephone service between same points.

3.4.11.1.4 Two pair, one from tower base and one from tower cab to local telephone exchange. On shot day minus one, three pairs are bridged at local exchange and brought direct to TG 3.1 Operations, Bldg. #311, Parry Island, for direct telephone service.

3.4.11.1.5 Two pair, tower base to cab and lift and tower hoist auxiliary controls to main controls for telephone service.

3.4.11.2 Radio Channel Requirements.

3.4.11.2.1 One channel, Circuit J–10, for communications between Hq, TU 3.1.4, located in Flag Office of AV–4, two LSU's, two LCPL's and one weapons carrier.

3.4.11.3 Equipment requirements.

3.4.11.3.1 Ten EE–8A telephones.

3.4.11.3.2 Five SCR–508 radio sets for Hq, TU 3.1.4, two LSU's and two LCPL's.

3.4.11.3.3 One SCR–510 for weapons carrier on shot island.

3.4.11.3.4 Special radio telemetering equipment furnished by TU 3.1.4.

3.4.11.3.5 One RA–83 rectifier.

3.4.12 Shot island security communications.

3.4.12.1 Wire Circuit Requirements.

3.4.12.1.1 Existing lines from top and base of tower to Bldg. #311, Parry Island.

3.4.12.1.2 Telephone net on shot island including boat dispatch, Bldg. #69, tower base and power house at Bldg. #69.

3.4.12.1.3 A wire net adjacent to tower using field wire and telephone and centering on an SCR–608 radio set.

3.4.12.2 Radio Channel Requirements.

3.4.12.2.1 One channel using radio sets SCR–300 located at the tower, boat dispatch, Bldg. #69, and power house as a back-up to wire net. Uses frequency assigned to Circuit J–12.

3.4.12.2.2 One channel for SCR–608 located at base of tower for communications to MP headquarters on Eniwetok uses frequency assigned to Circuit J–40.

3.4.12.3 Equipment Requirements.

3.4.12.3.1 Five EE–8A telephones.

3.4.12.3.2 One SCR–608 radio set.

3.4.12.3.3 Five SCR–300 radio sets.

3.4.12.3.4 One RA–83 rectifier.

3.4.13 TG 3.1 Operational and Control Wire Circuits (Figure 54).

3.4.13.1 Inter-communications Systems.

3.4.13.1.1 One seven station master inter-communications system inter-connecting TG 3.1 Control, Bldg. #311, Parry, JTF–3 Command Post, JTF–3 Operations Center, TG 3.1 Technical Group, boat dispatcher and air dispatcher, Parry Island.

3.4.13.2 Direct Telephone Circuits using EE–8A phone.

[redacted]

[redacted]

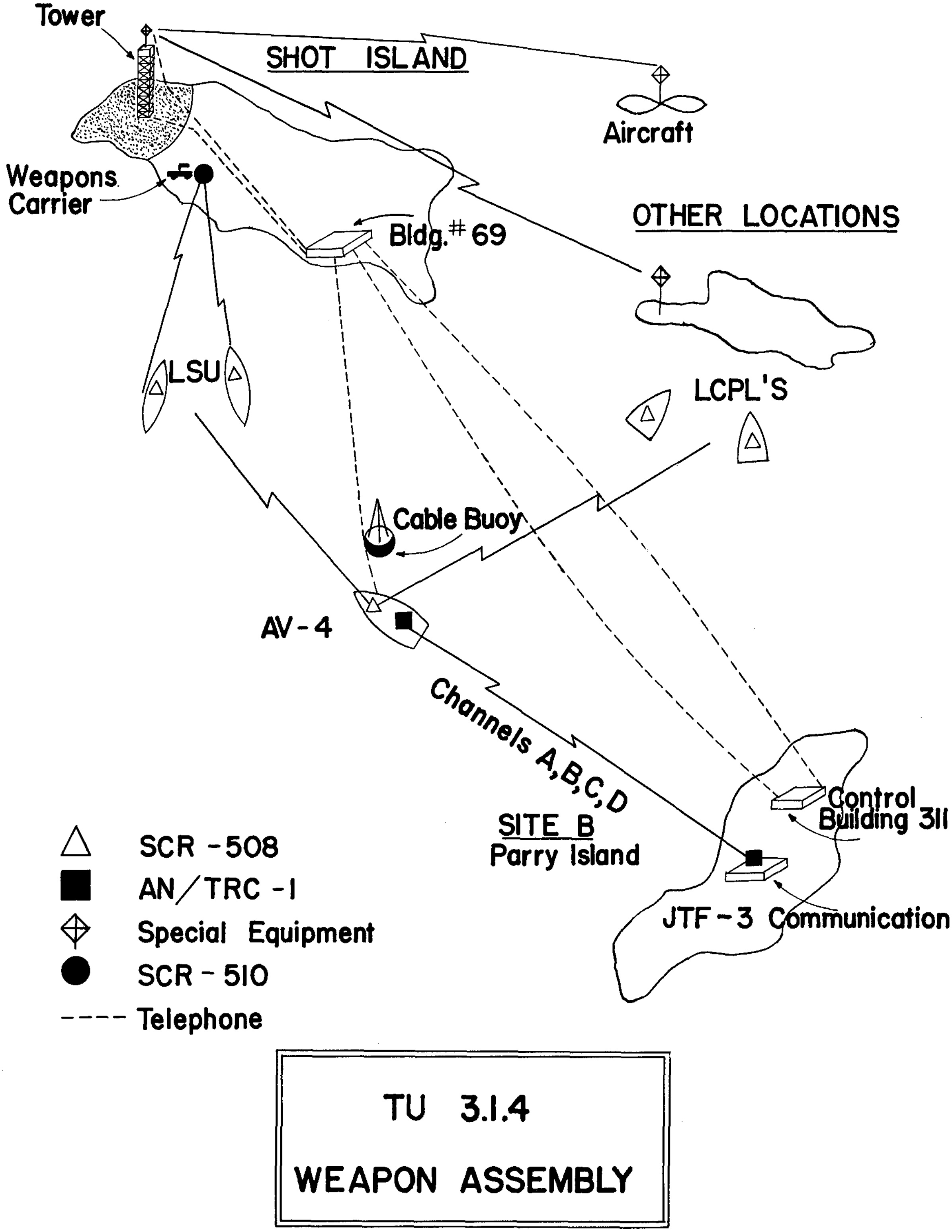

FIGURE 53

[redacted]

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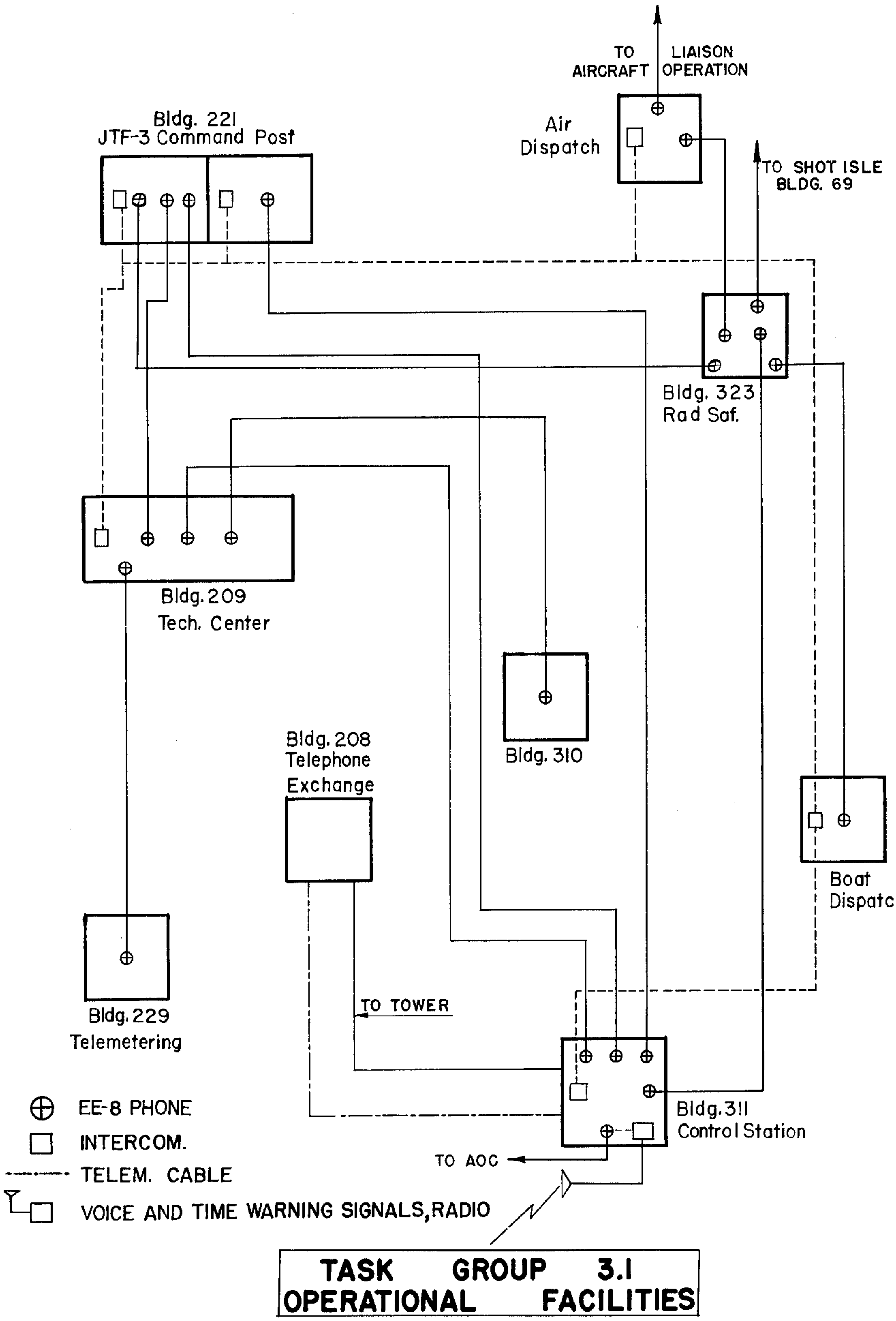

FIGURE 54

[redacted]

3.4.13.2.1 TG 3.1 Control to JTF–3 Operations Center.

3.4.13.2.2 TG 3.1 Control to top and base of tower on shot island.

3.4.13.2.3 TG 3.1 control to Rad-Safe Hq, Bldg. #323 Parry.

3.4.13.2.4 TG 3.1 control to AOC Eniwetok for voice time and warning signals.

3.4.13.2.5 TG 3.1 control to TG 3.3 Flag Plot USS CURTISS.

3.4.13.2.6 TG 3.1 control to Hq, JTF–3 Command Post.

3.4.13.2.7 TG 3.1 control to J–7 office bldg. #209, Parry.

3.4.13.2.8 TG 3.1 control to AOC Eniwetok.

3.4.13.2.9 J–7 office to Bldg. #229.

3.4.13.2.10 J–7 office to Bldg. #310.

3.4.13.2.11 J–7 office to Bldg. #311.

3.4.13.2.12 Liaison air strip Parry to liaison air operations Eniwetok.

3.4.14 The development, installation, operation and maintenance of telemetering, sequence timing, and electronic facilities for the remote detonation of weapons were responsibilities of Scientific Program Directors. The only responsibility of the Communications Officer with reference to these facilities was to provide required pairs in the intra-inter island cable system.

3.4.15 The installation, operation and maintenance of administrative communications at Los Alamos was accomplished by the AEC.

3.4.16 The AEC contractor, Holmes and Narver, provided a radio repair shop on Parry Island for the purpose of assisting the Communications Officer, TG 3.1, in the installation and maintenance of boat pool and tactical radio equipment. The civilian technicians employed by Holmes and Narver were not familiar with tactical signal corps equipment and although the instruction manuals supplied with these radio sets are quite complete, they were seldom read. Technical difficulties were experienced by operating and maintenance personnel through failure to observe precautions peculiar to the equipment. An example of this type of trouble is the damage to tubes in an SCR–300 radio set when it was operated without an antenna. This personnel also had little training or respect for supply discipline and control as practiced in the military service.

3.4.17 Task Group 3.1 was requested by Hq, JTF–3, to submit communications requirements of the scientific task units and by May 1950, types of tactical radio equipment available and suitable for use at the forward area were determined and requirements were submitted to Hq, JTF–3, for approval, supply action and assignment of frequencies.

3.4.18 Major items of communications equipment required by TG 3.1 in the forward area included:

Equipment	No. Required
SCR–300	58
SCR–510	31
SCR–508	32
SCR–543	2
Navy Type TCS, 12 Volt DC	8
Navy Type TCS, 115 Volt AC	3
SCR–624	5
SCR–542	4
Rectifier RA–83	7
Receiver SX–28	1

3.4.19 The J–5 Division, Hq, JTF–3 assisted in the procurement of equipment from the Chief Signal Officer. However, the installation, operation and maintenance of communications facilities required by TG 3.1 at Los Alamos was the responsibility of the AEC. The transmitting and receiving equipment of the Los Alamos terminal of the Los Alamos-Eniwetok radio teletype circuit were installed in adjacent rooms of the same building, shielded by steel reinforced concrete walls and metal doors. The transmitting and receiving antennas were installed at opposite sides of the building and separated by approximately 500 yards. The message center was located approximately two air line miles from the transmitting site. Some interference was experienced in reception due to the close proximity of transmitting and receiving equipment and antennas and it is recommended that the AEC take action to correct this deficiency.

3.4.20 Major items of radio and teletype required at Los Alamos included:

3.4.20.1 Transmitting and Receiving Site.

1 each BC–340(I) amplifier complete with RA–22H rectifier and RU–2C water cooling unit.

[redacted]

1 each BC–339L transmitter.
2 each CV–31B/TRA Converter.
2 each B–270/FRR diversity receivers.
2 each O–5/FR frequency shift exciters.
1 each BC–221AK frequency meters.
1 each Transmitting Rhombic antenna.
2 each Receiving Rhombic antennas.
1 each Model 19 teletypewriter used for monitoring.
1 each Model 15 teletypewriter used for monitoring.

3.4.20.2 Message Center.

2 each 131B–2 teletypewriter sets with Model 19 teletypewriter.
1 each Model 14AB typing reperforator and transmitter distributor.

3.4.20.3 Circuit between AEC Communications Center and TG 3.1 Rear message center.

1 each Model 14 teletypewriter.
1 each Model 15 teletypewriter.

3.4.20.4 Circuit between AEC Message Center and Military Systems Code Room same as Paragraph 3.4.20.3 above.

3.4.21 Radio installations were required in boats, vehicles, and at fixed stations in the forward area. No particular difficulties were encountered and no special considerations were necessary for the installations except protection from rain and salt water spray on the boats and vehicles.

3.4.22 The SCR–508 radio sets were installed convenient to the pilot in the wheelhouse in a wood or metal case with a protective canvas drop cover as shown in Fig. 55. In the LCM's a section was removed from the left side of the protective shield and a metal case was welded to the outside face as shown in Fig. 56.

3.4.23 The LSU's, Tugs, AVR's and water taxis were equipped with SCR–508 radio sets. The LCM's were equipped with SCR–508, SCR–619 or SCR–510 radio sets depending on the assigned duty of the boat. Where duties of the LCM's required radio service only occasionally, the sets were removed between operations because of the exposed wheelhouse.

3.4.24 It had been planned to use VHF equipment at the airstrips on Eniwetok, Parry, Runit, Biijiri and Engebi and in the liaison aircraft for ground-air and station-to-station communications, but as this equipment was not available, the HF equipment was retained in the aircraft and Navy type TCS radio sets were installed at the airstrips.

3.4.25 The radio sets in structures were mounted on tables or boxes, convenient to the operator (see Figure 57). Remote control units were not used except with the Navy-type TCS radio sets. Antennas were mounted on top of the buildings or on adjacent poles. (See Figure 58.) On the shot islands, a simple vertical wire antenna was installed that usually survived the blast (see Figure 59).

3.4.26 The portable SCR–300 radio sets were furnished for working parties and as a substitute, over medium distances, for phone service where wire lines were not available. As the demand for these sets exceeded the supply, it was necessary to furnish higher power sets as substitutes for this service. The SCR–508 and TCS sets were installed where special test or telemetering circuits were required by the Scientific Units.

3.4.27 Special wire and radio facilities were installed for use of the TG 3.1 operations section for operation principally during the critical period before and after the shots (see Figure 54). The wire service included, in addition to regular phone service, intercommunications sets, sound powered phones, and dry lines using EE–8 telephones. An important part of this system was the intercommunications service between D–3 Operations and liaison aircraft and marine dispatch. The SCR–543 radio sets were installed in the Control building for broadcast of the voice time and warning signals beginning at minus one hour. These signals were sent by wire and radio (back-up) to TG 3.4 Air Operations Center (AOC), Eniwetok, for broadcast on VHF to aircraft without HF receiving equipment, and by radio to TG 3.3 aboard the CURTISS for rebroadcast to ships and naval aircraft. The SCR–508 in the Control Building was installed for communications with CTU 3.1.2, TU 3.1.5 and the H&N boat net. A system of jacks and switches were installed on a work table in the Control Building to permit the D–3 personnel, wearing headsets, to plug in on any circuit concerned in the operations as shown in Figure 60.

[redacted]

FIGURE 55. Radio Set SCR 508 Installed in Water Taxi

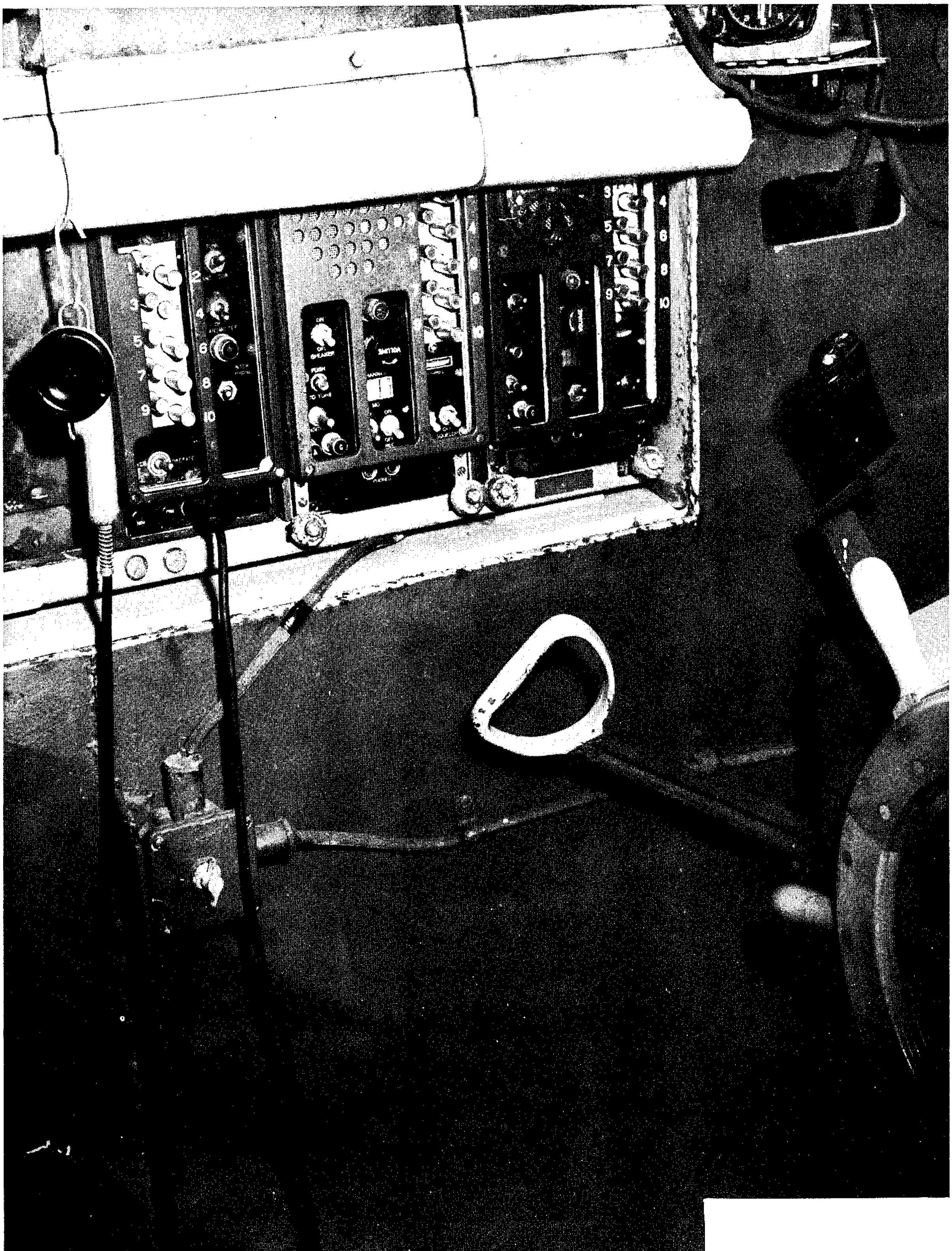

FIGURE 56. Radio Set SCR 508 Installed in Wheelhouse of LCM

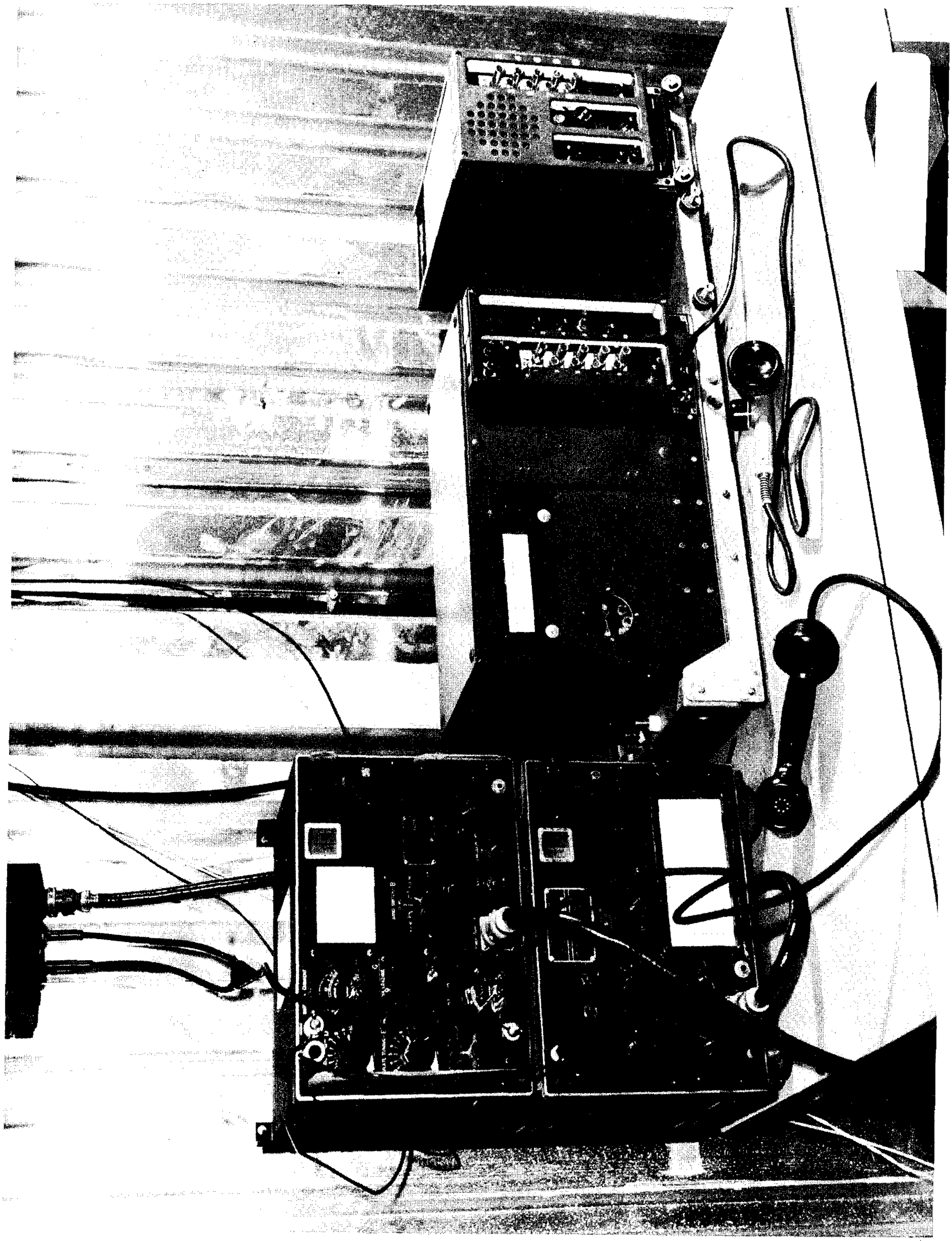

FIGURE 57. SCR 528 and 543 Used as Fixed Station TG 3.1

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FIGURE 58. Typical Antenna Installation SCR 508

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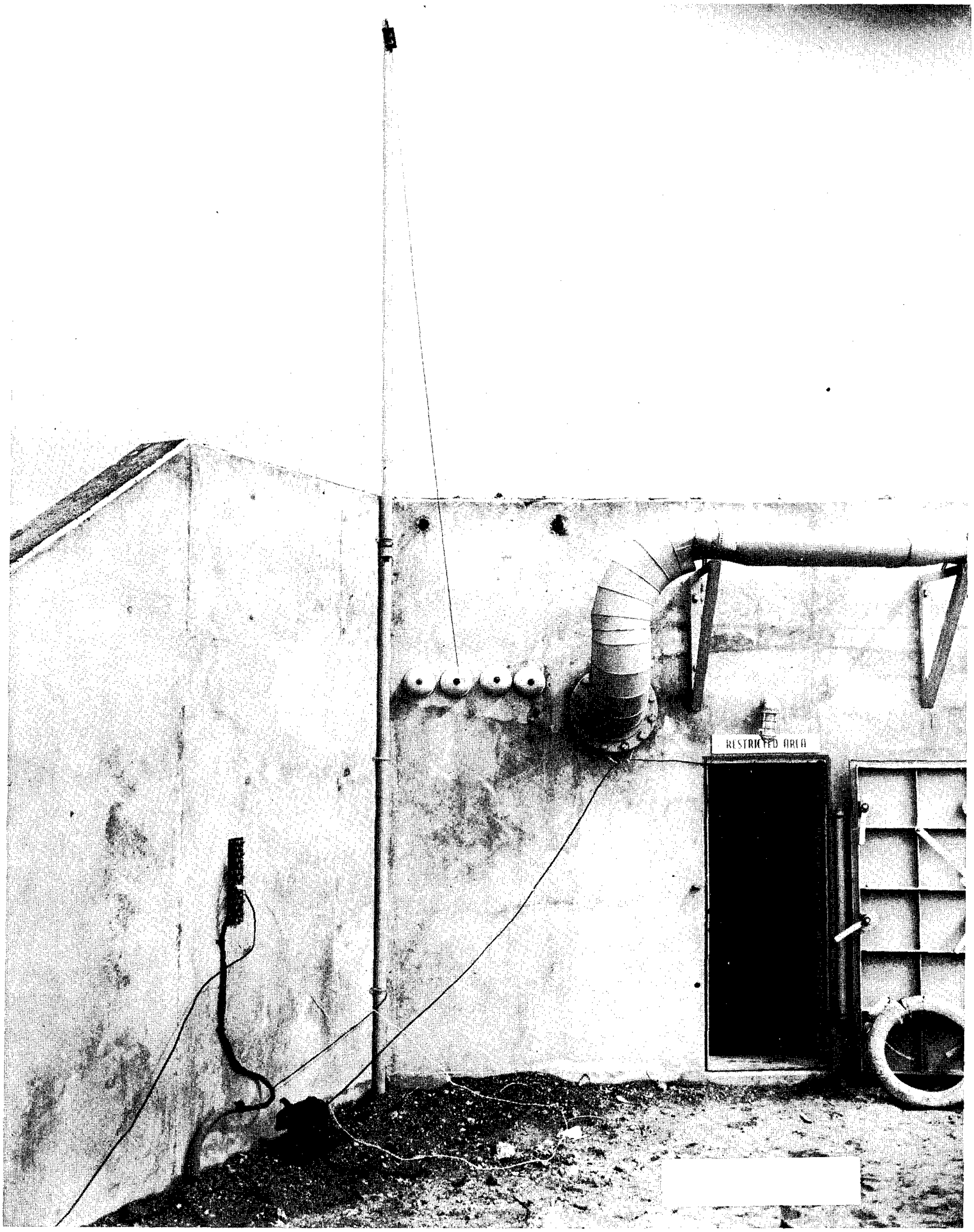

FIGURE 59. SCR 508 Antenna Installation Building 69, Shot Island

[redacted]

[redacted]

FIGURE 60. TG 3.1, Operations Center Communications Facilities

[redacted]

[redacted]

3.4.28 Schematic (Figure 23) shows the time and control signal cable system. The unloaded pairs in the inter-island telephone cable systems were used to supplement this system. The communications section, while not responsible for cable circuits for telemetering and time signals, coordinated requirements for these services with the J–6 Group and the H&N Wire Section, when such requirements were determined too late to be included in the instrumentation charts.

3.4.29 The layout of equipment in Bldg. #69 (Telephone exchange on each of the shot islands), is shown in Figure 61. This building houses the time and control signal relays, the telephone exchange, and a radio set used by Rad-Safe for communications to boats and as a back-up to the Task Units wire circuit. Terminals for direct lines to the Parry exchange or for connecting the emergency AN/TRC–1 equipment into the island phone system are mounted externally on the protective wings of the building. EE–8 telephones are connected to these terminals for use after the shot to prevent contamination of the building which would result from personnel using the inside phones.

3.5 Task Group 3.2 Communications Facilities

3.5.1 The 7127th AU Communications Detachment of the Army Task Group was given the mission of installation, operation and maintenance of Joint Task Force Administrative and Operational Communications Facilities under supervision of and with the assistance of installation teams arranged for by Hq, JTF–3. The engineering and installation of these facilities is covered in Section III, paragraphs 3.1 and 3.2 of this report.

3.5.2 Additional internal Task Group 3.2 communications included the following facilities and circuits (see Figure 62):

3.5.2.1 A port transportation office radio net.

3.5.2.2 A harbor control radio net.

3.5.2.3 A radio net between POL tank farm and off-loading ships.

3.5.2.4 A radio net between the Joint Transmitters Building and MSTS ships.

3.5.2.5 A military police security radio net.

3.5.2.6 A supply warehouse for the receipt, storage and issue of Signal Corps equipment and supplies required by all elements of the Task Force.

3.5.2.7 An installation and maintenance facility for the maintenance of tactical radio, special service broadcast radio transmitting and receiving equipment.

3.2.5.8 A time and Warning signals system for alerting all personnel on Eniwetok Island, Figure 63.

3.6 Task Group 3.3 Communications Facilities (See Figure 64)

3.6.1 Flagship Communications.

3.6.1.1 The standard installation of the flagship, USS CURTISS (AV–4) was employed for all Hq, TG 3.3 communications except for certain additional teletype communications center facilities and VHF radio equipment necessary for submarine cable back-up. This installation was entirely adequate and gave the expected performance. There were no major casualties to any of the communication equipment.

3.6.1.2 During Operation SANDSTONE in 1948, the USS CURTISS had been fitted with Signal Corps VHF radio equipment (AN/TRC–3) and Signal Corps one-time tape equipment, SIGTOT. In the intervening years, only a minimum of preventive maintenance had been accomplished and the CURTISS was committed to the war effort in the Far East and was not available for inspection or modification until January 1951. The AC/S J–5, Hq, JTF–3, decided to replace and rearrange the entire installation. The Signal Corps provided new equipment and arrangements were made for its installation under J–5 Division supervision at the San Francisco Naval Shipyard (Hunter's Point) in January of 1951. Figures 65 and 66 show the resulting installation in the teletype transmitter room while Figures 67 and 68 represent the installation in the SIGTOT room. In the interest of flexibility, a rearrangement of teletype equipment in the main radio station was made as shown in Figures 69 and 70.

3.6.1.3 While under way to the forward area, the technicians discovered that modifica-

[redacted]

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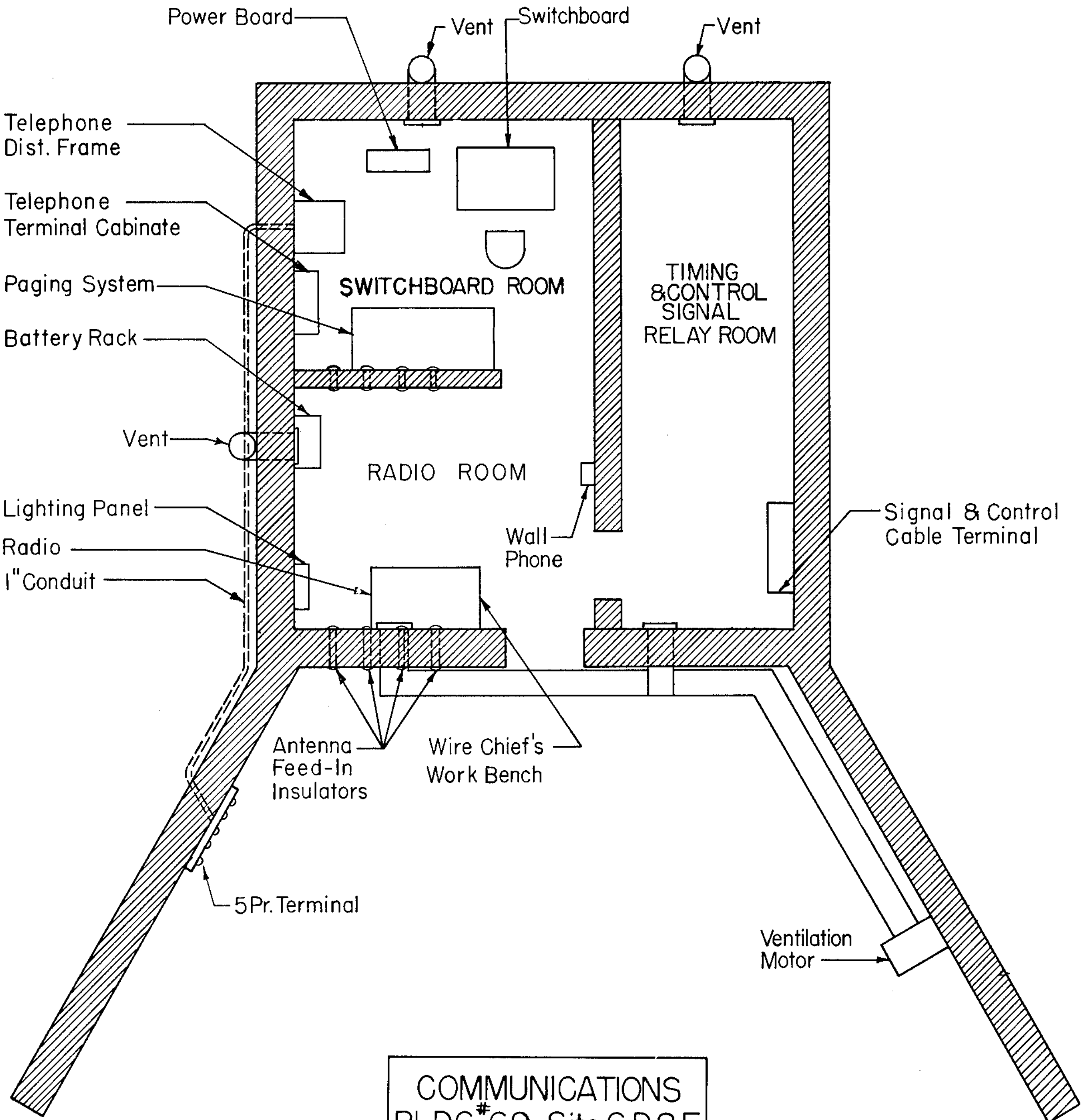

FIGURE 61

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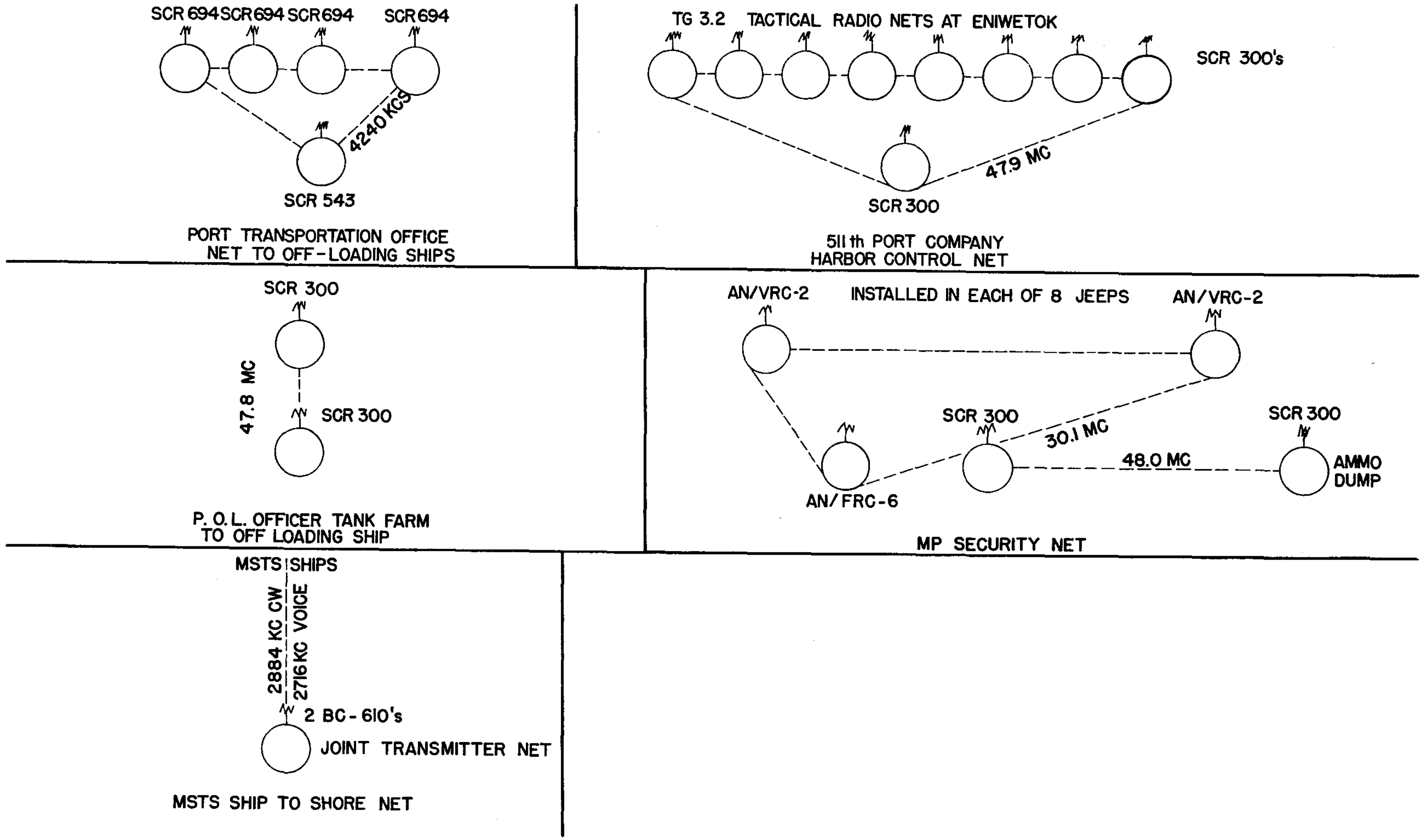

FIGURE 62. TG 3.2 Radio Net

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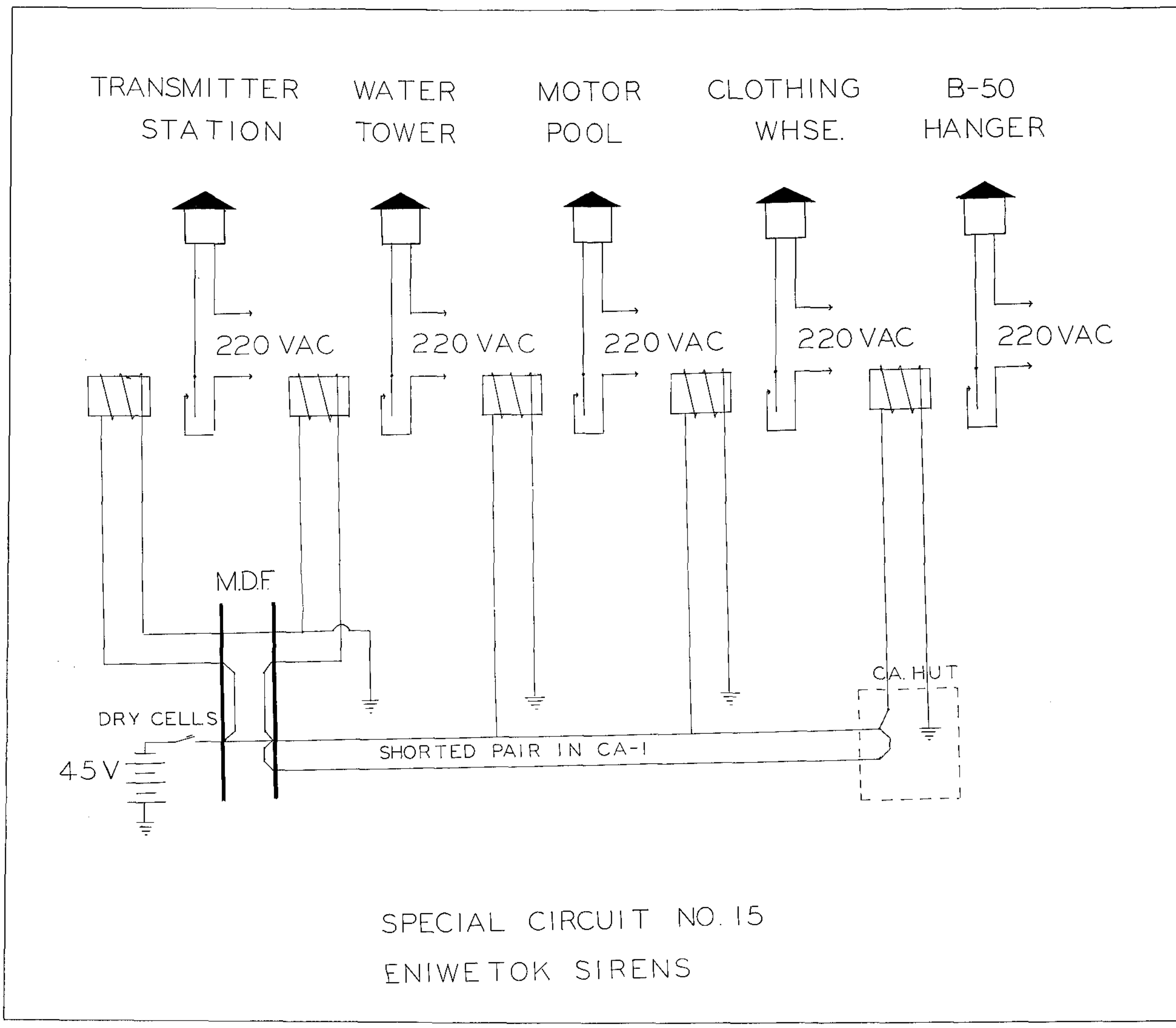

FIGURE 63

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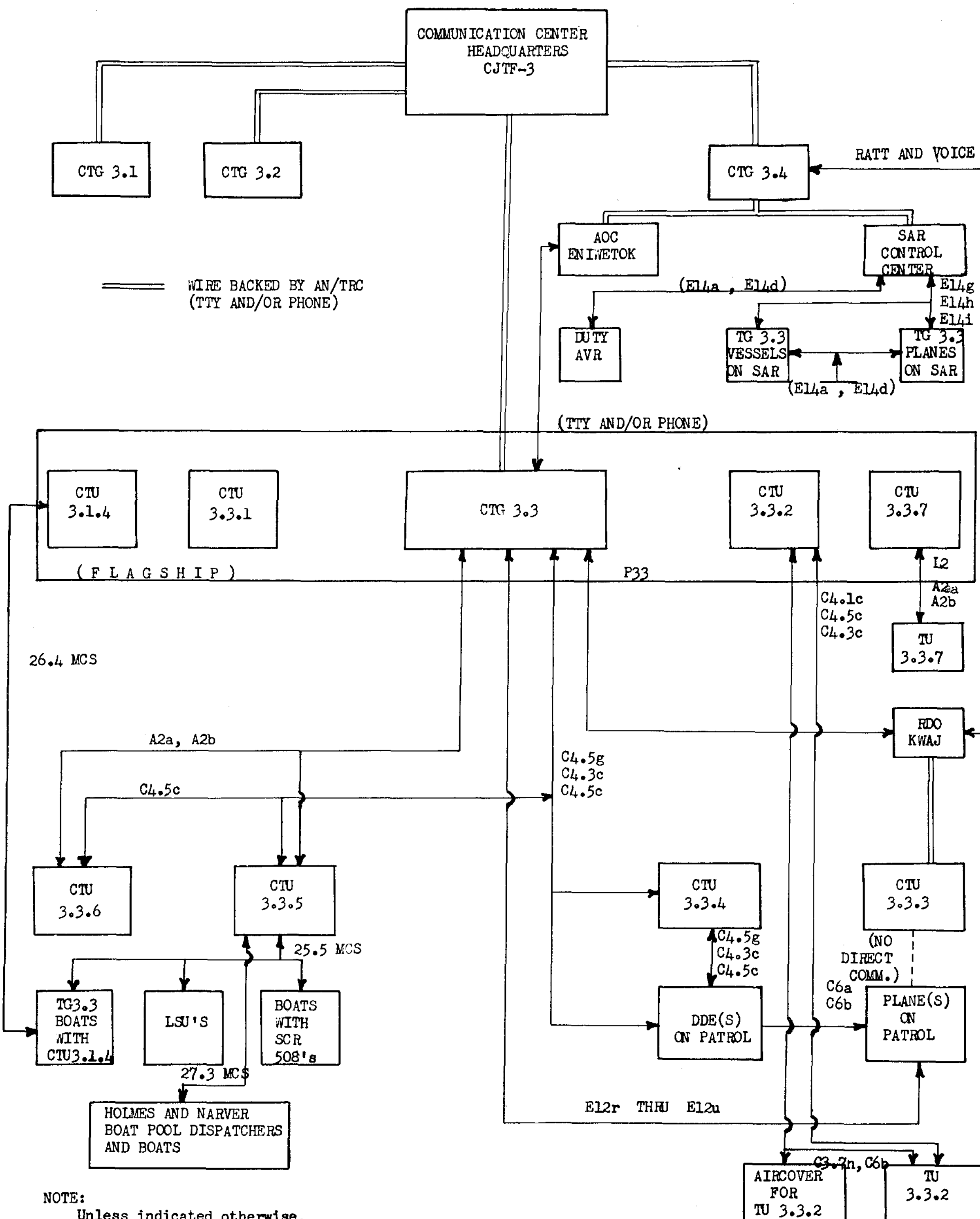

NOTE:
Unless indicated otherwise, circuit designations (from JANAP 195(b) and frequencies appear to the right or above circuit lines.

FIGURE 64. TG 3.3 Communications Facilities

[redacted]

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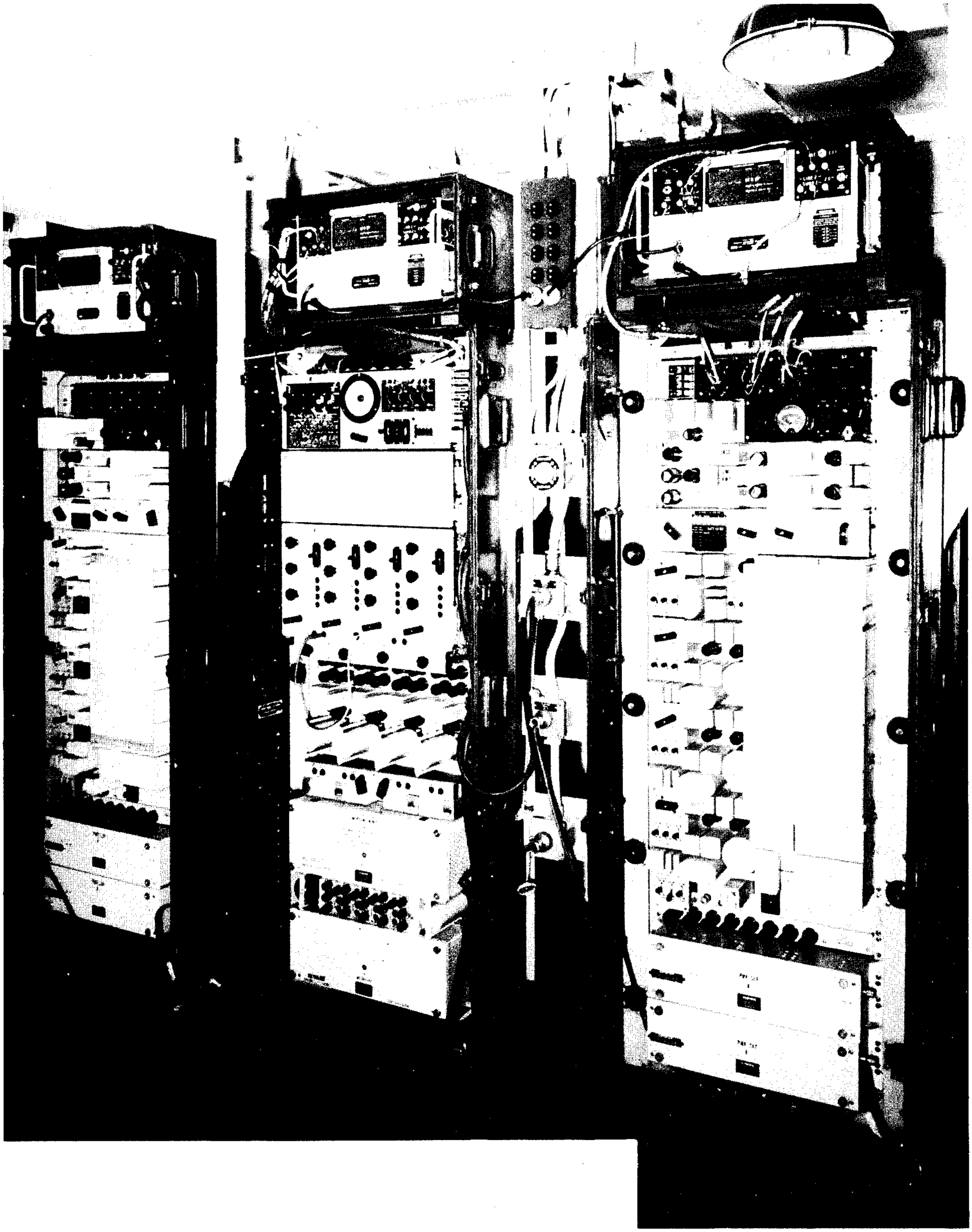

FIGURE 65. Carrier Equipment Installed Aboard USS CURTISS

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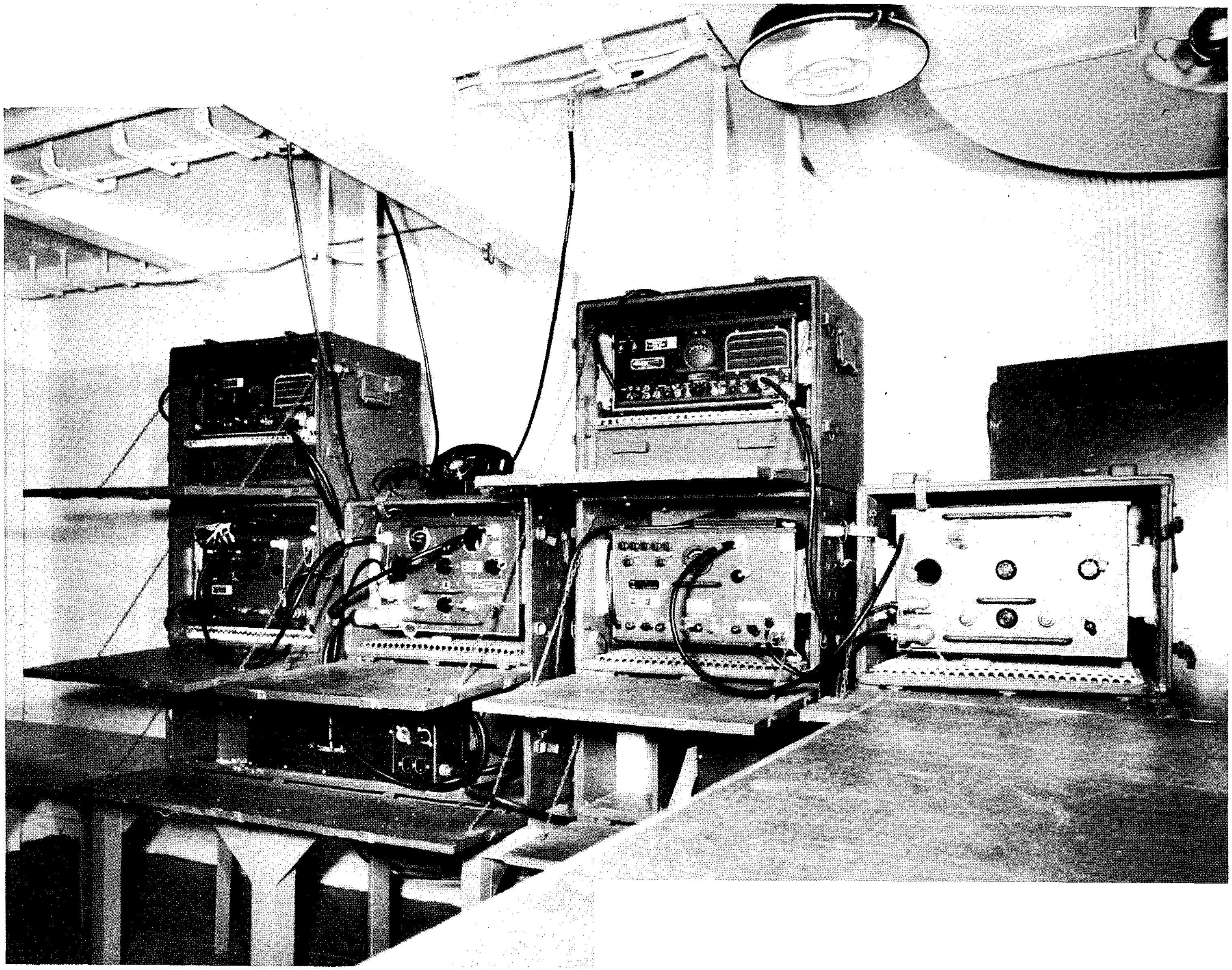

FIGURE 66. AN/TRC Equipment Installed Aboard USS CURTISS

[redacted]

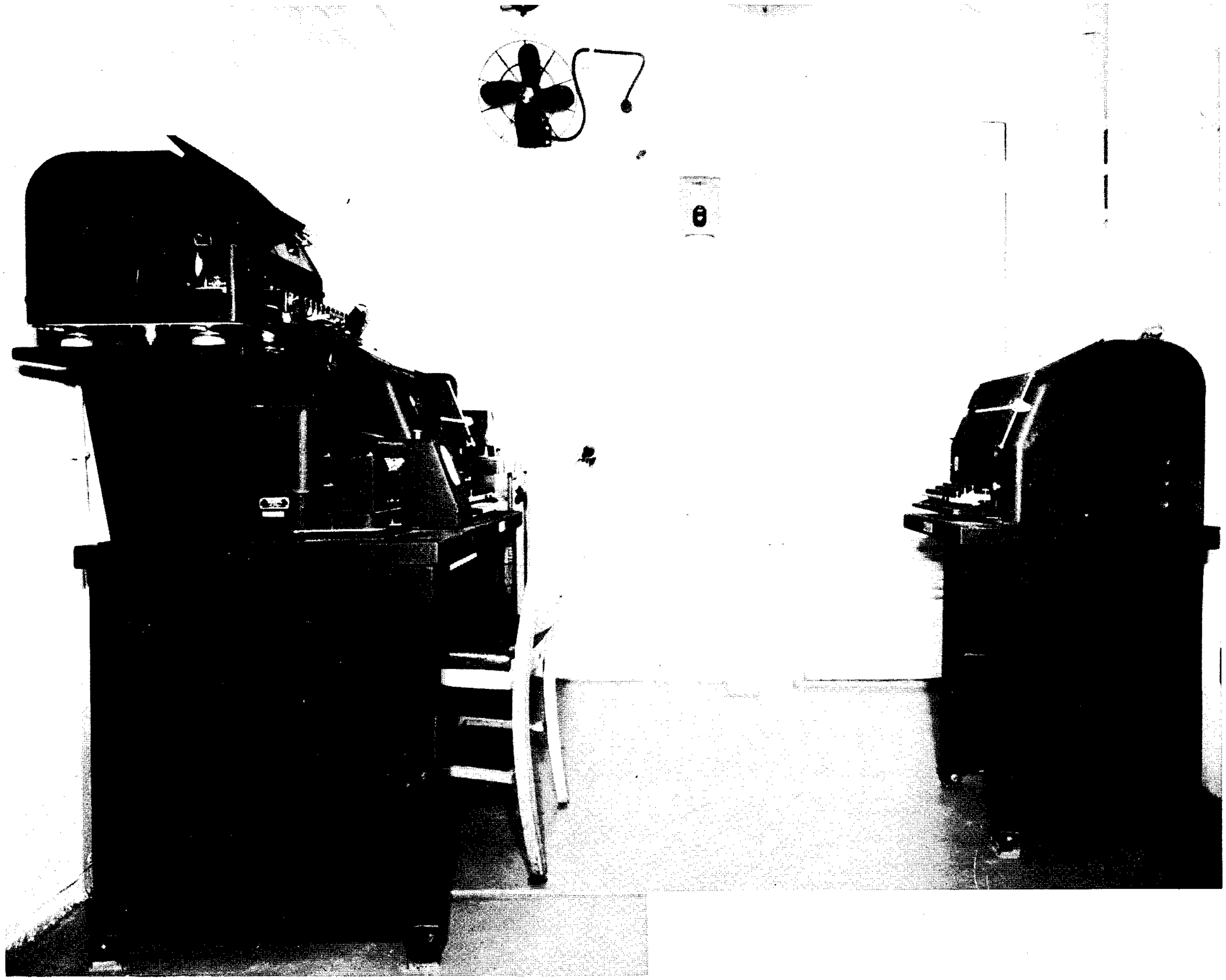

FIGURE 67. Teletype Room, USS CURTISS, Looking to Port

[redacted]

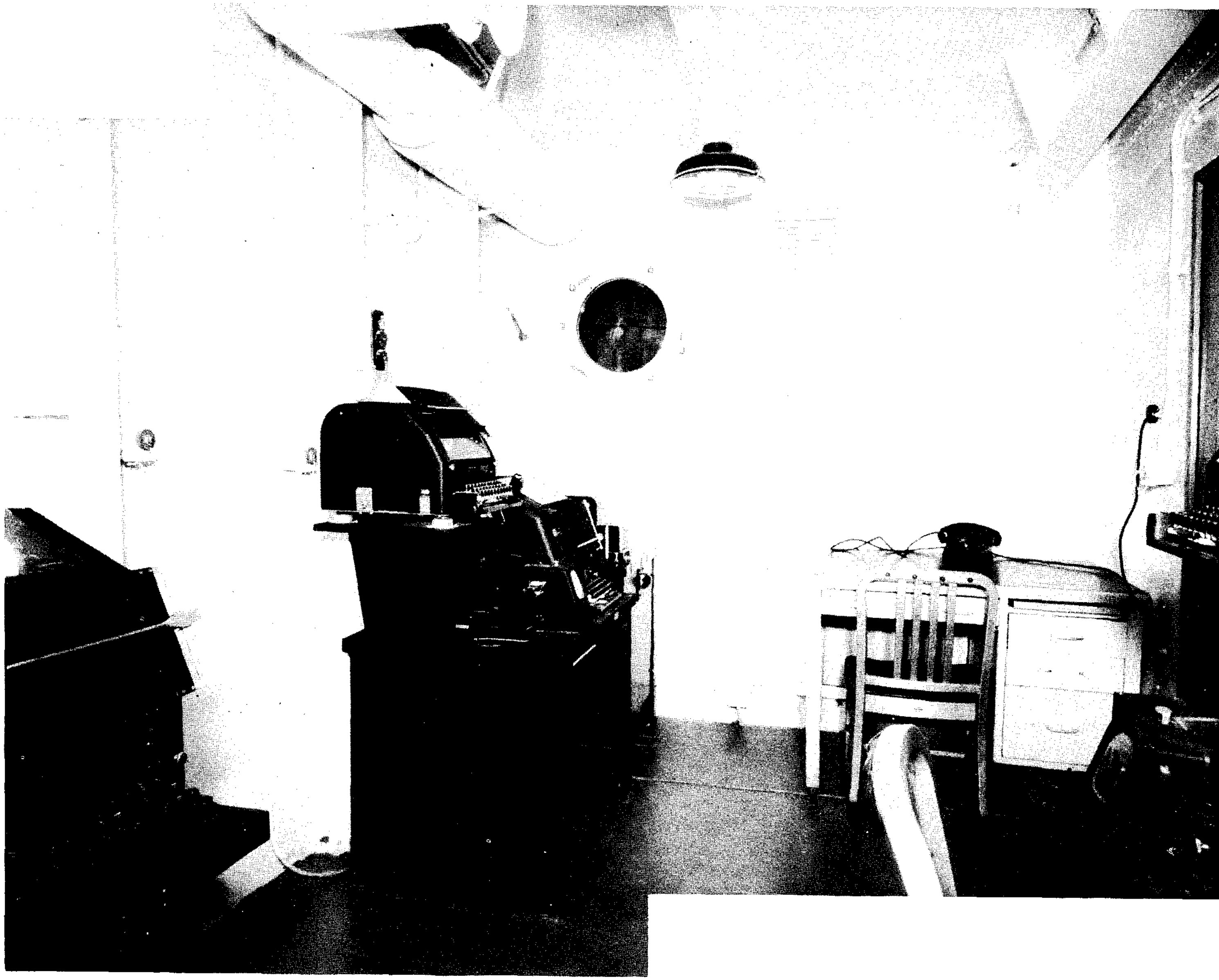

FIGURE 68. Teletype Room, USS CURTISS, Looking to Starboard

[redacted]

FIGURE 69. Radio 1 Boat Deck, USS CURTISS, Looking to Port

[redacted]

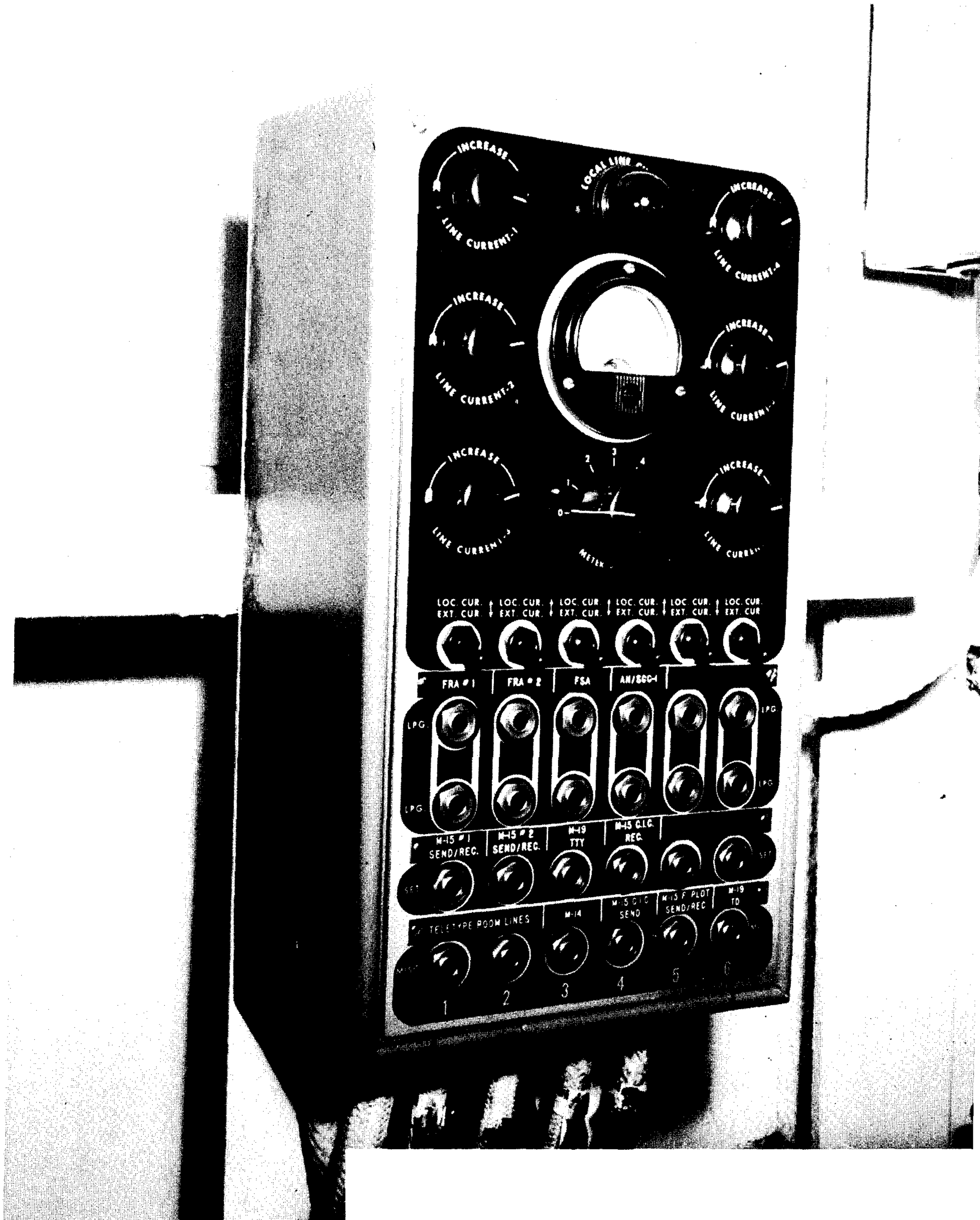

FIGURE 70. Teletype Room Jack Panel, USS CURTISS

 [redacted]

tions would have to be made in the wiring of the teletype transfer panels (TT–23/SG) and to the Model 19 teletypewriter in the SIGTOT room. Prior to this, because of a shortage of jacks in the TT–23/SG, it was necessary to use two 131B–2 equipments patched together to obtain a plain text version of a message received in a one-time tape system. The schematic wiring diagram of the modified transfer panel is shown in Figure 71. This change resulted in all units in the SIGTOT room coming into jacks and only when a patch was made was any piece of equipment connected to an external teletype loop or circuit. A similar modification (Figure 72) was made to the TT–23/SG transfer panel in the main radio station so that several pieces of equipment could be patched together, yet all equipment was isolated except when a patch was made.

3.6.1.4 The telephone installation to the several shore exchanges gave excellent service during the entire operation. A new Attendant's Cabinet was obtained through the Bureau of Ships for the flagship to replace its obsolete board. During the operation, 138 phones were served by the 100-line ship's service switchboard of the flagship and there was a definite requirement for a total of 170 phones. While a 100-line board is entirely adequate during the normal operations of the flagship, it is evident that a 200-wire board is necessary for these special missions.

3.6.1.4.1 The utilization of the 6 pairs in the submarine cable from the shore varied due to operational requirements. For example, prior to a shot, there was a requirement for several direct telephone lines. A switching arrangement was developed and constructed in the forward area which would provide for:

Normal conditions:	4 lines to the Attendant's Cabinet
	1 line between TG 3.4 AOC and Flag Plot
	1 line for the teletype circuits to Hq, JTF–3 Communications Center and to the Weather Central at Hq, TG 3.4.
Prior to and during shot conditions:	1 line to the Attendant's Cabinet
	1 line between the AOC and Flag Plot
	1 line between CTG 3.3 and CJTF–3
	1 line between Operations Center of JTF–3 and Flag Plot
	1 line between TG 3.1 Control Center and Flag Plot

3.6.1.5 Provision was made to substitute VHF radio back-up circuits for buoy cable circuits when the ship was absent from a buoy or in the event of buoy cable failure. A rotary type switch had been installed by the shipyard to permit the necessary switching from the submarine cable to the AN/TRC equipment under the "normal" conditions shown above. To provide the necessary switching "prior to and during shot" conditions, a bank of plugs and jacks—the type used in the sound powered phone installations was employed. This work was accomplished by ship technicians and the resulting schematic wiring diagram is shown in Figure 73.

3.6.1.6 To indicate to the users of the telephones the fact that the AN/TRC equipment was being employed with no provisions for the security of their transmissions, a "beeper" was installed locally by the technicians. The output of an audio oscillator was keyed approximately 96 times per minute by a small "flasher" motor. The resulting tone was introduced into the telephone side of each CF–1 telephone channel at about 2,500 cycles, and thus clearly heard by people using the telephones.

3.6.2 Boat Pool Communication.

3.6.2.1 The employment of boats within the lagoon involved distances ranging up to 25 miles. In the interest of improving the overall efficiency of boat employment, the decision was made to equip some of the boats with radios of a Signal Corps type. The SCR–508 was settled upon because of its adaptability to the power supply available, its availability in sufficient quantities, and its frequency range. Operating in the 20 to 27 mcs band, this equipment did not interfere with other frequencies being employed in the joint operation, but did, however, permit interception at a considerable distance. Army units employing the same sets in Korea, for example, could be heard almost daily on the receivers at ENIWETOK. The SCR–508 was placed in 3 AVR's, 3 LSU's, 7 LCPL's and 5 LCM's operated by the TG 3.3 boat pool (TU 3.3.5

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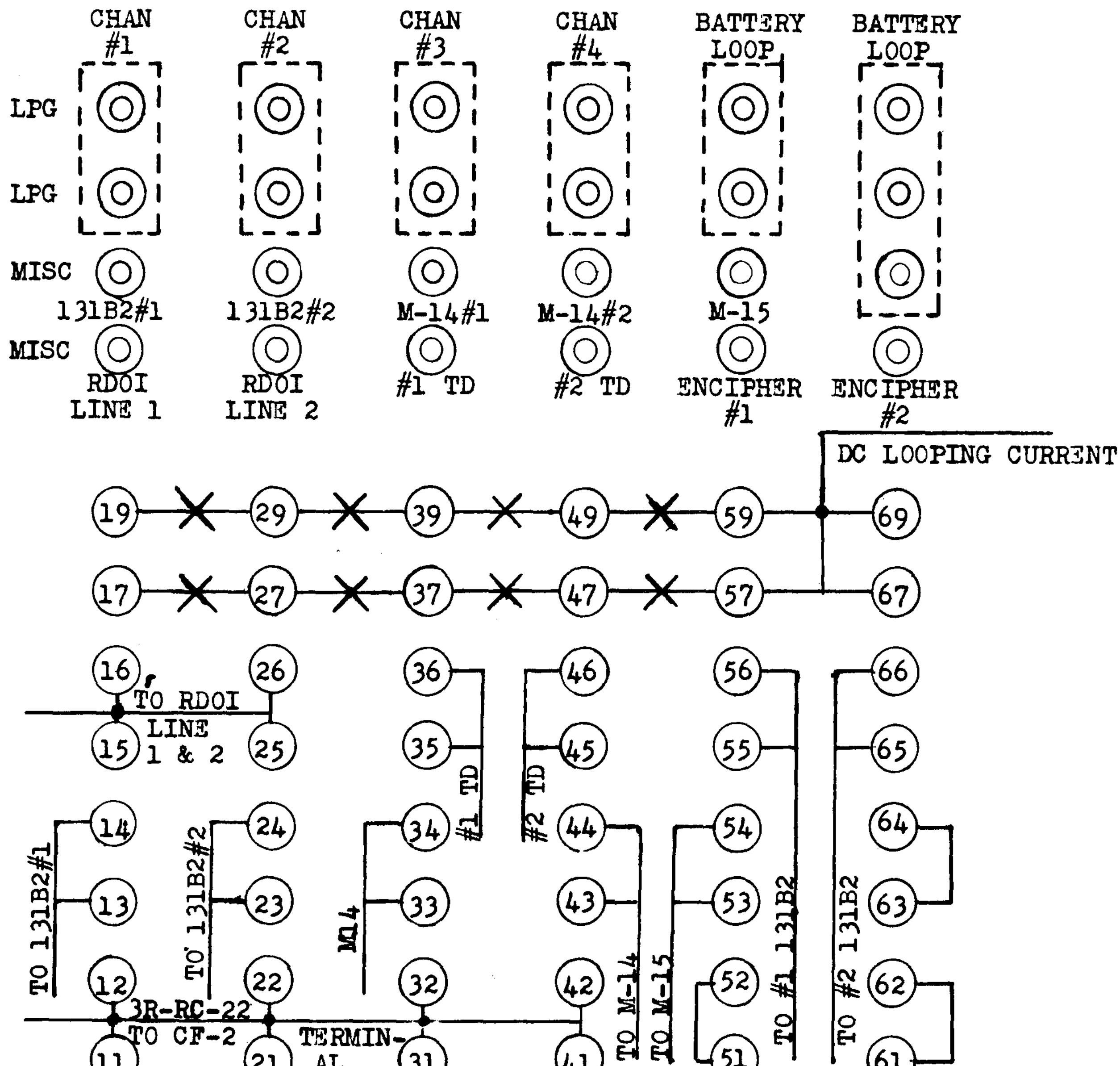

SIGTOT TT23/SG
AS MODIFIED

FIGURE 71

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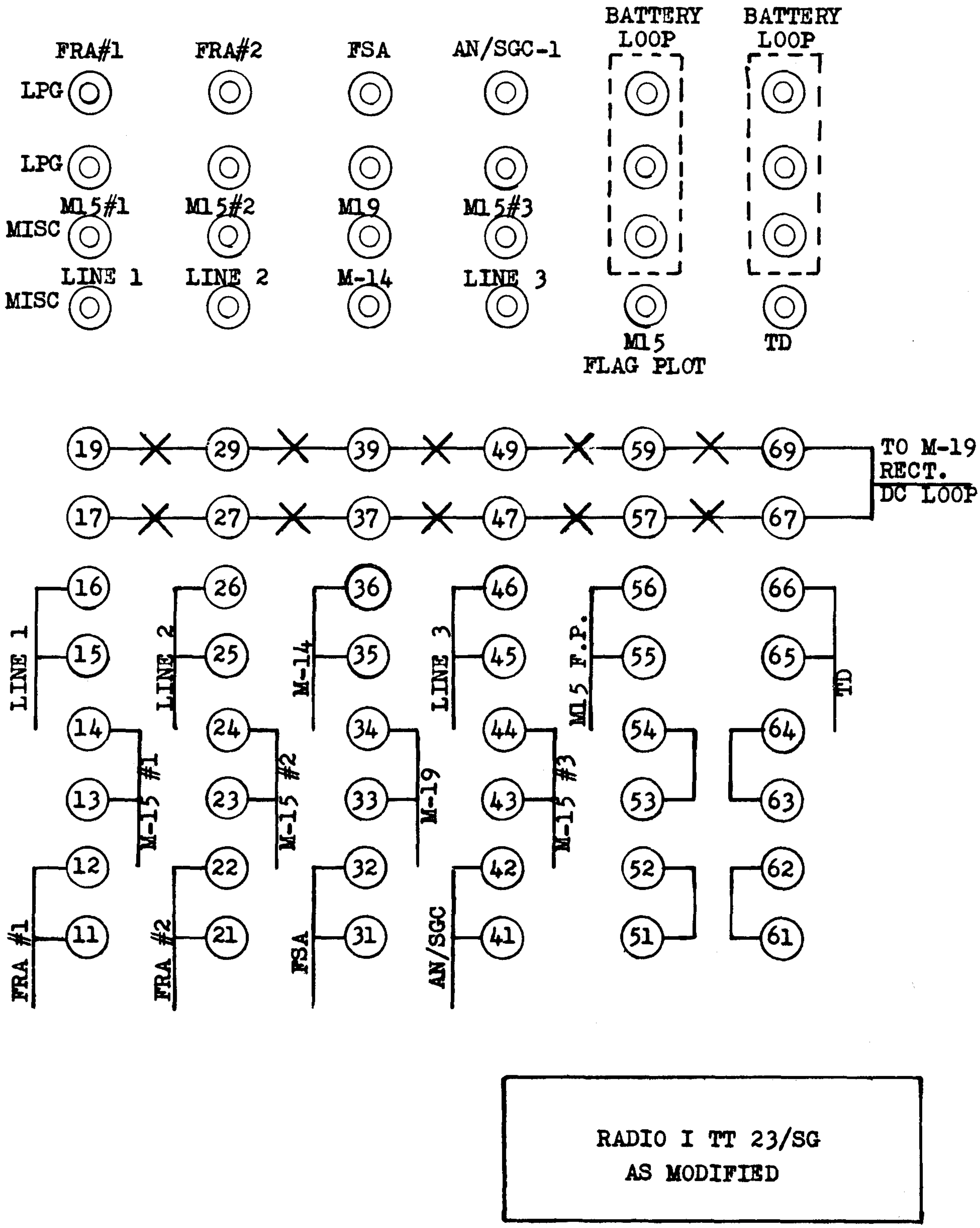

FIGURE 72

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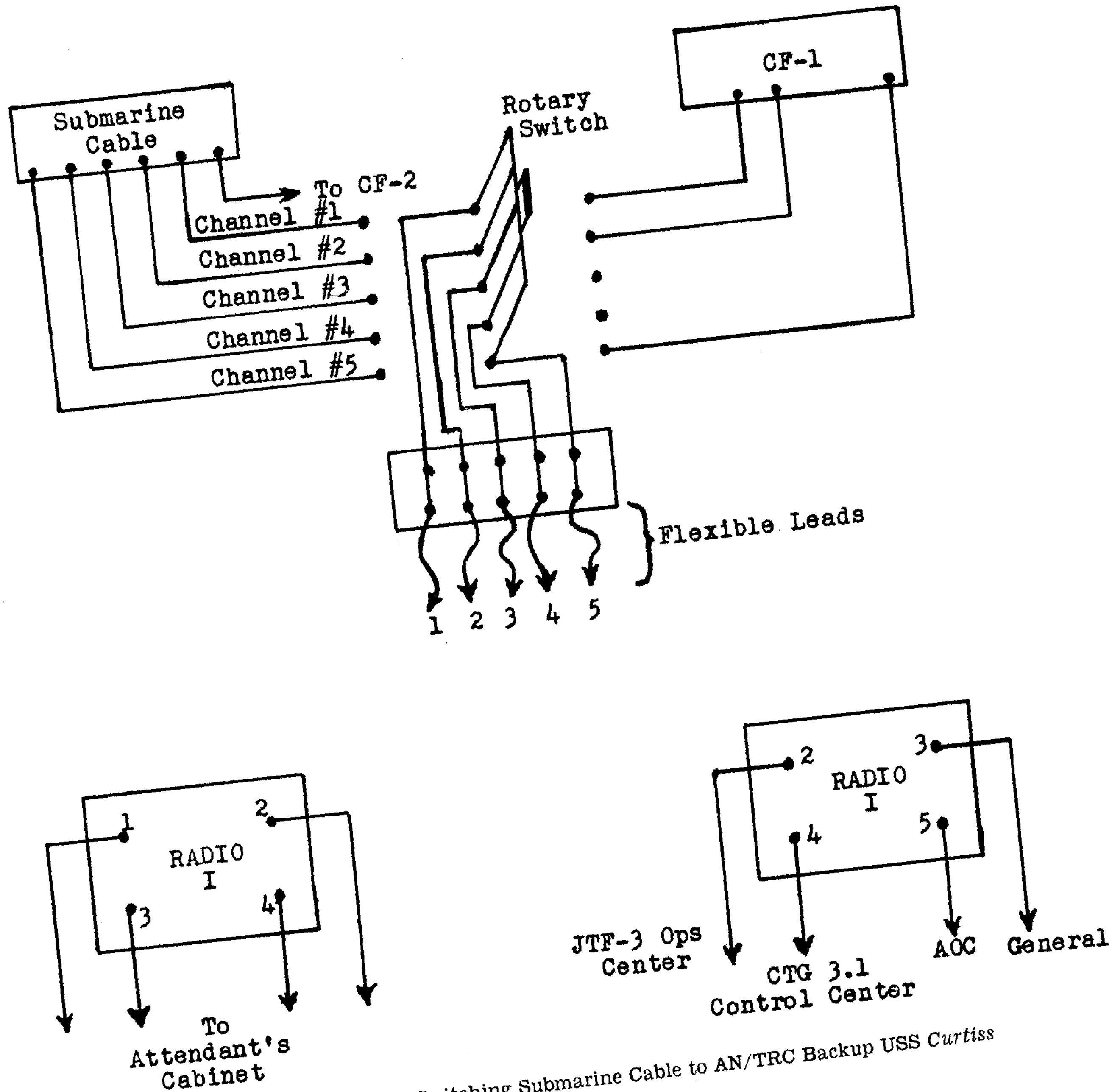


FIGURE 73. Telephone Switching Submarine Cable to AN/TRC Backup USS *Curtiss*

[redacted]

and boats assigned to the USS CURTISS) which operated a total of 46 boats of all types.

3.6.2.2 Regardless of their location, all boats except the LCPL's were able to communicate satisfactorily with the boat pool commander. The LCPL's operating from the CURTISS maintained good communications at distances of only a few miles. This inefficiency was caused by the impossibility of keeping the antenna insulator dry and free from a coat of salt. When these sets are installed in an all-metal hull boat, they must be insulated from the hull since these boats employ a positive ground while the sets are designed for a negative ground.

3.6.2.3 Occasionally, boats in which no radios were installed were sent on special trips of one sort or another. To provide communications for these trips, portable (and with self-contained power supply) SCR–510's were employed.

3.6.2.4 CTG 3.3 installed an SCR–508 in his Flag Plot in order to provide communications with the boat pool commander (CTU 3.3.5) and with the individual boats. In this manner, CTG 3.3, could when necessary, effectively coordinate and control the movement of boats within the lagoon.

3.6.2.5 The apparent absence of coordination in the channelling (i.e., the assignment of frequencies to particular buttons) of the sets employed in the boats operated by CTU 3.3.5 and in the boats operated by Holmes and Narver for CTG 3.1 caused difficulty in communicating between the boats of the different pools and between the dispatchers and boats operating from another pool.

3.6.2.6 There was a definite need for some emergency means of communication with the boats since on several occasions boats went aground, their predicament was not realized for several hours, and then there was no means of communications to coordinate the rescue operations.

3.6.3 Harbor Defense Communications.

3.6.3.1 In the early planning stage of the operation, the decision had been made to employ the model JM–4 sonobuoys and associated equipment in the harbor defense at the Atoll. Two harbor entrances, the Wide and Deep Passages, were to be "guarded" by these listening devices. To provide the maximum coverage at the entrances with the minimum of equipment and the attendant decrease in maintenance, a plan was formulated whereby eight sonobuoys, separated by a distance of approximately 1,300 yards, would be placed on an arc across the Wide Passage, two sonobuoys separated by about the same distance would be placed across the Deep Entrance and that the monitoring receiver would be located at the southern end of Eniwetok Island in the vicinity of a 120-foot tower on which the receiving antenna could be installed. The resulting distance to the outermost buoy from the receiving antenna would be approximately 7 miles.

3.6.3.2 Communications between the sonobuoy receiver operator and the Harbor Defense Control Center in the USS CABILDO was by means of telephone and/or voice radio.

3.6.3.3 The sonobuoy equipment was available at the Naval Supply Center, Pearl Harbor, T. H., and at the direction of CINCPAC, Commander Service Forces, Pacific, assigned the task of rehabilitation and installation of this equipment to the Pearl Harbor Naval Shipyard. In order to provide spares, a total of twelve sonobuoys and two receivers were rehabilitated, with the costs chargeable to Commander, Service Forces, Pacific Fleet Ship Repair Fund. The task of reconditioning completed, this equipment was loaded on 20 January 1951 aboard the USS TORTUGA for transportation to the forward area, where installation was accomplished by the USS ELDER on 23 February 1951.

3.6.3.4 An inspection of the installation on 24 February 1951 revealed that seven of the transmitter buoys were missing, having apparently developed leaks, sinking and breaking their tie cables. One of these was retrieved. As the battery rafts for the equipment were still in position and as it was determined that the replacement transmitter buoys, when received, could be placed by TU 3.3.6 personnel with the LCM fitted as a maintenance boat, the USS ELDER was released.

3.6.3.5 A message was sent to COMSERVPAC requesting additional equipment to replace the missing items. At the same time, CTU 3.3.6 took steps to obtain the release for reactivation and installation of certain sono-

buoys in possession of the local AEC organization. The installation of the new and rehabilitated equipment allowed the new sonobuoy screen to go into operation on 2 April 1951.

3.6.3.6 During the operational period, considerable difficulties were had in maintaining the screen in operable condition. The major casualties were broken tie cables (connecting transmitter buoy to the battery raft), frayed power cables, leaking gaskets, broken shock mounts and broken antenna whips. As a result of these failures, there was an average of only 60% of the sonobuoys in operation at any one time.

3.6.3.7 The sonobuoy detection range for surface vessels was good, the maximum range recorded being 3,800 yards on a small freighter; however, small surface craft such as LCM's were picked up at very short range, only 300 to 400 yards in most cases.

3.6.4 An Air Patrol Net.

3.6.4.1 Due to the distances involved, and the need for maintaining communication with the airborne patrol planes, a series of frequencies utilizing CW emission was deemed necessary for this net. Since the particular frequencies selected from JANAP 195(B) were being used by a Patrol Wing in the Far East, clearance for their use was sought and obtained from the Frequency Allocation Panel of the U. S. Joint Communication-Electronic Committee (FAPUSJCEC) through CJTF-3.

3.6.4.2 When airborne, planes reported to CTG 3.3 on this net and secured frequencies with their base at Kwajalein. All departure, arrival, position and contact reports were then made direct to CTG 3.3. Upon arriving at the base, the planes secured the Air Patrol Net and established communication on base frequencies.

3.6.4.3 In the event communications were lost between CTG 3.3 and the patrol plane, the latter shifted to the base frequencies. Even though several "overdue plane" alerts were initiated as a result of these planes failing to file an arrival report promptly, the practice was encouraged.

3.6.5 Surface Patrol Net.

3.6.5.1 The planned operations for the surface units kept them within the Danger Area, and therefore within range of a single medium high frequency. To insure that communications would be rapid and accurate, CW emission was employed.

3.6.5.2 This circuit was also employed as a Task Group Common. (See para. 3.6.8.)

3.6.6 Plane-Ship Contact Coordination Net.

3.6.6.1 In order to provide close coordination between air and surface units engaged in developing a contact, a medium high frequency voice circuit as well as a VHF voice circuit was assigned to this net.

3.6.6.2 Time and Warning signals from CTG 3.1's Control Center were automatically rebroadcast over this net for the information of the surface and air units of this task group.

3.6.7 CTG 3.3 to Patrol Squadron Commander.

3.6.7.1 The Patrol Squadron Commander (CTU 3.3) was based at Kwajalein, and some fairly direct means of communications between this unit commander and Commander Task Group 3.3 were necessary in order to coordinate the employment of the patrol planes. CTU 3.3.3 lacked both equipment and the personnel to maintain communications on the Air Patrol Net. Through the efforts of JTF-3 headquarters, CTG 3.3 obtained from the FAPUSJCEC permission to enter the MARGILS Base Net. Radio Kwajalein, already a participant in this net, accepted traffic for relay to CTU 3.3.3.

3.6.7.2 As will be noted in paragraph 3.6.11, this circuit also provided CTG 3.3 a means of entry into the Navy Teletypewriter Exchange System.

3.6.8 Task Group Common.

3.6.8.1 Visual communications backed by a VHF voice circuit were originally planned as the Task Group Administrative Common. Because of the distances (as much as 21 miles) between the flagship and the anchorages assigned most other vessels, CTG 3.3 could not avail himself of either of these means. As a result, the Surface Patrol Net was employed as a Task Group Common.

3.6.8.2 The Ship-Shore voice circuit might have been employed as the Task Force Administrative Common, but would have been

[redacted]

slow because of the large amount of encrypted traffic involved. Vessels which, because of personnel and/or equipment limitations, normally guarded the ship-shore voice circuit were directed to come up on the Surface Patrol Net to receive traffic from and to send traffic to CTG 3.3.

3.6.9 Search and Rescue (SAR) Communications.

3.6.9.1 The communications plan of CTG 3.3 provided that initial reports of distress of his units or of other units in distress sighted by either his patrol planes or surface vessels, should be made over appropriate task group circuits. In such cases, the responsibility for alerting SAR centers rested with CTG 3.3.

3.6.9.2 Communications with the SAR Control Center on Eniwetok were provided through a duplex teletype circuit to the AACS relay room on Eniwetok and by a direct telephone line to the AOC from CTG 3.3's Flag Plot.

3.6.9.3 Included in the mission of CTG 3.3 as assigned by CJTF–3's Field Order No. 2 (Revised) was the provision that TG 3.3 will assist TG 3.4 in Search and Rescue operations. To carry out this provision, Commander Task Group 3.3 considered that the initial assignment of units of his Group to an SAR mission would be made by him. Consequently, ships and planes when ordered on such a mission by CTG 3.3 were directed to report at that time on the SAR Coordinating frequencies to the SAR Control Center for operational control.

3.6.10 Emergency Communications.

3.6.10.1 In the event that an emergency evacuation of the atoll was ordered, Hq, JTF–3 and TG 3.1 would be evacuated to the flagship of CTG 3.3. While the fact was stressed that during such an evacuation, communications would be kept to a minimum, communication planning of CTG 3.3 nevertheless provided for an additional circuit into the Navy Teletypewriter Exchange System.

3.6.10.2 CTG 3.3, through CINCPAC and CNO, obtained the inactive Guam-Kwajalein circuit for use during emergencies as well as during such times as an overload circuit for CJTF–3's long haul circuits was required. Upon the authority of CINCPAC, arrangements were made directly with Radio Guam which provided that the circuit would be activated on signal from CTG 3.3 and that it would be operated either as a CW circuit or a RATT circuit, dependent on the situation facing CTG 3.3. During the operation, this circuit was activated only twice in anticipation of emergencies which actually did not develop. Evacuation was contemplated as a result of the proximity of typhoon GEORGIA and as an emergency protection against fall-out after GEORGE shot. At these times, CW communications were quickly established with radio Guam.

3.6.11 Communications with Naval Commands not directly concerned with the operation.

3.6.11.1 The Joint Task Force Communication Plan provided that messages destined outside the forward area could be cleared through the Parry Island Communications Center.

3.6.11.2 Commander Task Group 3.3 considered that from the viewpoint of operator training and of reducing the load on the JTF–3 Communications Center, it would be desirable to clear all outgoing messages from TG 3.3 units at Eniwetok through Radio Kwajalein. To provide communications with the Patrol Squadron Commander, the circuit to Kwajalein had to be manned continuously, and since this circuit was able to carry the load, it was used for messages addressed to commands not directly concerned with the operation. These messages entered the Navy Teletypewriter Exchange System at Kwajalein.

3.6.11.3 Three frequencies were available for use on this circuit (MARGILS Base Net), but at no time could CTG 3.3 get Radio Kwajalein to shift to any but one, Kwajalein preferring to stay on 6440 kcs. The reason given for this preference was a lack of equipment. Consequently, loss of communications did occur, but no serious delays resulted.

3.6.11.4 Incoming traffic was delivered either through the Joint Task Force Communications Center or by means of the Fox schedule which was copied on teletype during the entire operation.

[redacted]

3.6.11.5 In the event that the message traffic load had warranted, the CW/RATT circuit with Radio Guam could have been employed.

3.6.12 Visual Communications.

3.6.12.1 Visual means of communication were relatively ineffective because of the distances which normally separated units. Too, no provision had been made for a shore signal tower in the area.

3.6.13 Conclusions.

3.6.13.1 The submarine cable–AN/TRC installations for providing communications between CTG 3.3, the CJTF–3 and other task group commanders was adequate, and except for the telephone lines, did not operate to its fullest capacity. Between the hours of 0830 and 1030, the telephone switchboard was definitely overloaded with delays of approximately 20 minutes occurring in some cases. These delays are not believed to be due to exceeding the capacity of the submarine cable, but rather are believed to be due to the inadequacy of the 100-line ship-service switchboard on the USS CURTISS. At the present time, this board is serving a total of 138 phones, but in order to provide all important staff and civilian personnel with phones there is a definite requirement on board for a total of 170 phones. A considerable amount of the aforementioned delays were caused by waiting while personnel were being called to the phone. The board is, however, entirely adequate when the ship is employed as a Seaplane Tender.

3.6.13.2 Because of the lack of coordination in the channelling of the boat radio equipment, difficulties in communicating between boats from the two pools and between the respective dispatchers and boats from the other boat pool did result.

3.6.13.3 Communications between the USS CURTISS and the LCPL's, while employed, did not appear to be a necessity; and insufficient number of LCM's (the workhorse of the boat pool) were radio equipped.

3.6.13.4 A requirement exists for some emergency means of communicating with all boats.

3.6.13.5 Although effective as a detection device, the JM–4 Sonobuoys require considerable effort to install and to maintain. Even though the currents are not excessive in the Atoll area, the steady wind of some 20 knots makes replacement and repair to the equipment difficult.

3.6.13.6 The Surface Patrol Net, while employed in this operation as a Task Group Common for administrative traffic, could not have been so used had there been either more patrol vessels or more contact activity. VHF is not adequate for this purpose.

3.6.13.7 Although the Patrol Squadron Commander might possibly require direct communications with the planes on patrol, the operational control of these planes must rest with the commander who is to issue their orders and instructions upon development of a contact—this operational control can be expressed only through a direct communication circuit with the planes and not by relay.

3.6.13.8 From an emergency and overload standpoint and because of the absence of alternate communication sites, there is a definite requirement for a circuit (either CW or RATT) between the Naval Task Group Commander and a shore radio station in the Navy Teletypewriter System.

3.6.14 Recommendations.

3.6.14.1 If the USS CURTISS continues to be employed in similar operations, either BuShips or the AEC should authorize the replacement of the 100-line telephone switchboard by a 200-line board. There is sufficient space in the present compartment for such an installation, and because of its location, the factor of weight compensation would not have to be considered.

3.6.14.2 Coordination of the channel assignments for boat radios should be made on the Joint Task Force Headquarters level and should be promulgated as early as practicable prior to the start of an operation.

3.6.14.3 At least 80% of the LCM's should be radio equipped. Smaller boats except special purpose boats such as the AVR need not be radio equipped.

3.6.14.4 *Very* pistols and/or signal rockets should be part of the boat equipment, and a code developed for emergency communications with the boats.

[redacted]

3.6.14.5 PCE's anchored within the lagoon at the Wide Passage and Deep Entrance should be employed for the purpose of detection and denying underwater entry into the lagoon.

3.6.14.6 Sonar gear of the "HERALD" type should be employed for the purpose of detecting underwater entry into the lagoon.

3.6.14.7 An additional medium high frequency voice or CW circuit should be provided for use as a Task Group Administrative Common.

3.6.14.8 The frequency plan of the Task Group Commander should provide for a patrol plane net between these planes and the Naval Task Group Commander. The Patrol Squadron Commander should be provided with equipment and personnel necessary to enable him to guard this circuit.

3.6.14.9 The Naval Task Group Commander must provide for a circuit which will give him direct access to the Naval Rapid Communication System.

3.7 Task Group 3.4 Communications Facilities

3.7.1 General.

3.7.1.1 As a tenant on a base operated by the Commanding Officer of Task Unit 3.4.1, Headquarters, Task Group 3.4 required telephone and intercommunication systems in addition to off-island communications furnished by the AACS Task Unit 3.4.3. Although the Table of Distribution for Task Unit 3.4.1 included a communications maintenance officer, it became necessary for the Deputy Chief of Staff, Communications and Electronics, to closely monitor this function as regards the intercommunications network. A requirement developed for a public address system and a radio crash-alarm system which was also monitored by the Deputy Chief of Staff, Communications and Electronics.

3.7.1.2 Installation and operation of the Eniwetok telephone system was a responsibility of Task Group 3.2, and the amount of service it was to afford Task Group 3.4 was determined at a conference with the AC/S J-5, Hq, JTF-3. At the conference, fifty-seven (57) cable pairs were allocated to Task Group 3.4 with no limitation placed on the number of instruments on a single pair. The limited telephone facilities increased the demand for other means of communications between the widely dispersed headquarters personnel. An intercommunications system of twelve master stations, using LS-124B/FI equipment was installed, with the following subscribers: Commander, Chief of Staff, Deputy Chiefs of Staff, Personnel, Operations, Communications, Materiel, Adjutant General, Inspector General, Comptroller, Base Commander, and Commanders of Task Units 3.4.5 and 3.4.6. A second inter-communications system was provided for expanded operations network that included Base Operations, Control Tower, Fire Station, Weather, Task Unit 3.4.3, Receivers, Ground Controlled Intercept, Fighter Flight, Refueling Unit, Runway Clearance Team, Air Rescue Service, and Task Unit 3.4.2 Operations. The outside plant installed by Task Group 3.2 was used wherever available. In absence of existing cable between points of communication, Task Group 3.4 personnel installed dual 10-pair cable and maintained the installed equipment.

3.7.1.3 A requirement existed for vehicular radios to be installed in the class #155 fire trucks, the Control Tower, and the jeep assigned to the runway clearance team. Since there was no appropriate equipment in Air Force stocks, four SCR-508's were procured from and installed by the I&M Section of the Signal Section, Task Group 3.2. Operating frequency selected was 27.9 megacycles.

3.7.1.4 Briefings of official observers to the test on Task Group 3.4's participation in Operation GREENHOUSE required a public address system that could be moved from place to place with speed. No public address systems were available within the Eniwetok Atoll since the equipment requisitioned for this purpose from the Zone of Interior never arrived. A 110 volt AC system was borrowed from the Navy at Kwajalein and two outdoor horn-type loudspeakers. This was mounted on a jeep to satisfy the requirement for speedy movement. A new 6 volt DC system with at least 60 feet of microphone cord should be considered for this purpose on the next operation.

3.7.1.5 Careful, long-range planning on matters of frequency allocation paid large div-

[redacted]

idends on Operation GREENHOUSE. By providing two or three frequencies for every channel of importance there was no outage due to poor selection of frequencies. Usually, one of the frequencies would carry the bulk of the traffic; but at one time or another during the mission, all assigned frequencies were used advantageously.

3.7.1.6 During the period that the Air Task Group was located in the Zone of Interior, a communications cryptocenter was operated in the Headquarters building. The terminal equipment of this facility was connected to a leased commercial landline which was terminated in the Pentagon Building in the USAF Teletype Central. In order to expeditiously process severe traffic loads to certain locations important to the preparatory phase of the project, a one-time tape system was employed. Systems in common were held with Headquarters, USAF; Headquarters, Task Group 3.4, Advance (on Eniwetok); Headquarters, JTF–3; and Headquarters, Air Materiel Command. Traffic volume on the facility rose to a peak load of approximately 85,000 groups during the month of January 1951, the last month of ZI operation. The success of this small facility and subsequent difficulties encountered with cryptographic arrangements made in the forward area, emphatically suggests the organizing of a permanent cryptocenter for the Task Group in future operations.

3.7.1.7 The base communications activities in which the Deputy Chief of Staff, Communications and Electronics, was involved were of small proportions operationally. The principal duties of the Deputy Chief of Staff, Communications and Electronics were, as they should have been, the exercising of staff supervision over the entire communications and electronics program of the Task Group. Figure 74, a circuit diagram, is illustrative of the nature of this responsibility.

3.7.1.8 A command post from which all air activity within the Eniwetok area could be controlled and whose functions would also include Air Defense of the area was a requirement peculiar to the Air Task Group supporting Operation GREENHOUSE. In order to satisfy this requirement, the Air Operations Center was created. In its final form, the Air Operations Center encompassed several agencies responsible for feeding pertinent data into this nerve center for evaluation, posting, plotting and dissemination to other correlated and interested agencies. In order to clearly present a picture of the Air Operations Center, and to show how the communication and electronic equipment and technical operation personnel functioned, the following activities are set forth separately:

3.7.1.8.1 The AOC operated under three conditions. Alert Condition "A" required that plotters be stationed behind specific boards only, and it was not essential that the radar set be operational. This condition was in effect during periods of minimum activity. Alert Condition "B" required that essential personnel would man their positions, and one complete crew would be on duty in the GCI station; the radar set would be operational, and plotters would man vertical plotting boards for air defense purposes. Alert Condition "C" required that all positions in the Ground Control Intercept Station be manned, radar set operating, plotters behind all vertical plot-boards in the AOC, and all observers and controllers present in their assigned positions within the AOC. This condition applied during actual atomic weapon tests. During critical periods (Condition "C") when experimental aircraft were airborne and the testing of a weapon was imminent, the AOC provided the means for controlling test aircraft taking part in the exercise. It also functioned as an Air Defense Control Center during this period of time.

3.7.1.8.2 To accomplish its mission, the AOC employed many of the procedures and methods commonly used by the Air Defense Command, Aircraft Control and Warning, Ground Controlled Intercept, and Early Warning Stations. Information as to the movement of Military Air Transport Service, or other air traffic, was fed into the AOC from the AACS Task Unit 3.4.3 to the flight information center located within base operations, thence to the AOC either by telephone or messenger. The GCI station was responsible for data pertaining to present position and identification of all test aircraft, and the plotting of unidentified targets. Fighter type (F–80)

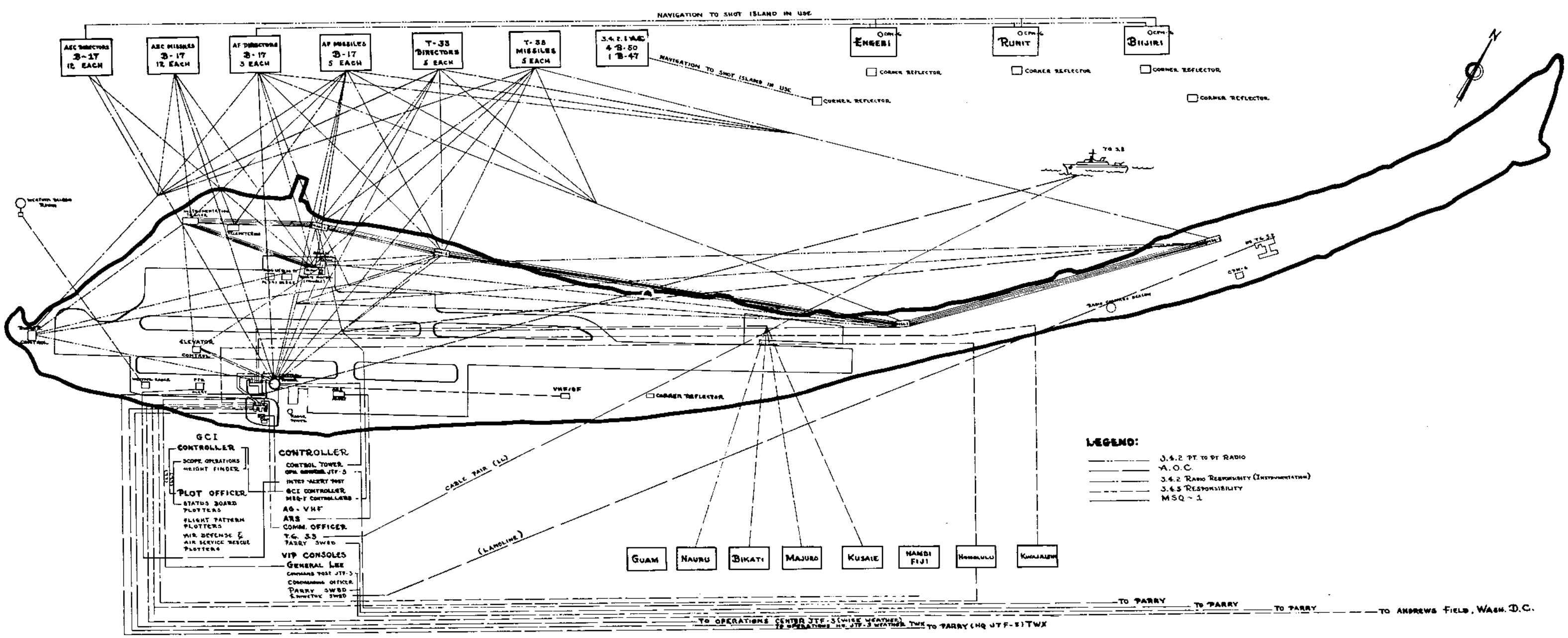


FIGURE 74. ATG 3.4 Communications

[redacted]

aircraft were kept on the alert in the event that hostile or unidentified aircraft should penetrate the Eniwetok danger area.

3.7.1.8.3 Four radar operators were assigned to track certain test aircraft, telling the track number, azimuth, and range to plotters who posted these positions on the vertical plotting boards stationed in the TPI room. These plotters identified the blips on the horizontal plotting board, and plotted the tracks. These were photographed and projected onto a motion picture screen located within the AOC and visible to the Commander, controllers, and observers. Radar operators were assigned, on an average, seven of the tracks for which they were responsible. These aircraft took off at various intervals prior to "H" hour. The track number, range, and azimuth data for each blip was passed on an average of once every two sweeps of the antenna when traffic was light and once every three sweeps when all aircraft were airborne. For simplicity of GCI calculation, the speed of rotation of the radar antenna was six revolutions per minute.

3.7.1.8.4 Tracks were assigned to radar operators with particular attention given to selecting those that would be following patterns generally within the same quadrant. It was found that a strictly 90° quadrant was not entirely satisfactory because of the constant shift of tracks from one quadrant to another. Tracks were assigned as mentioned above, so that those assigned to one operator would not cross the ones assigned to another operator. Radar operators followed the assigned tracks from point of takeoff to "H" hour. However, positive identification of each individual aircraft at "H" hour was not possible due to the concentration of all aircraft in the target area. Every effort was made through the use of the height finder and IFF for identification at that time. Aircraft were plotted on a strictly quadrant basis after "H" hour, until a great number of them had landed. Then positive individual identification was made of targets still airborne, and the data was passed to the plotters until the completion of the mission.

3.7.1.8.5 Two officers were utilized in the GCI station for the purpose of monitoring, supervising, and advising radar operators of track identification, tracks not being reported, and in general assisting radar operators and plotters so as to present a better picture of the air activity.

3.7.1.8.6 Tracks were usually picked up immediately after take-off, when identification was positive, and assigned to the radar operators concerned. Identification was preserved by continuity of track. If while aircraft were flying their predetermined patterns, and identification was uncertain, the range and azimuth of the target was called in to the height operator (employing an AN/TPS-10 height finder) for identification. Targets could be positively identified through this method due to all test aircraft being assigned a definite altitude. Except for one pattern, altitude separation was in effect. Certain test aircraft flew out as much as 60 miles in their pattern, and occasionally it was impossible for the AN/TPS-10 to receive a return impulse. Strong consideration should be given to providing a height finder with more range for future similar operations.

3.7.1.8.7 Test aircraft were required to fly a definite altitude and pattern and to maintain strict time schedules. Identification could be made in most cases from observing the pattern flown by test aircraft.

3.7.1.8.8 A fifth radar operator was assigned the task of air defense surveillance. His scope was delayed 50 miles and any target appearing on his scope, unless positively identified as friendly, was plotted on the Air Defense Board located in the AOC. Plotting was continued until contact could be made and aircraft identified as friendly or until fighter aircraft could be scrambled for the purpose of interception and identification.

3.7.1.8.9 Because of electrical interference, it was necessary to shut down the radar set at a critical point in the mission so that certain radio controlled aircraft could make radio checks. The results of a shut down, even for a short period of time, were that considerable time was required for re-establishing proper identification of tracks and still more time consumed in getting tracks plotted and projected on the TPI screen.

3.7.1.8.10 Throughout the entire project the unit was manned and operated in the ca-

 [redacted]

pacity for which it was designed: early warning. Fighter planes were on constant standby to intercept unidentified aircraft, and while airborne, were directed by the chief radar controller. Radar pick-up range of course depended on the type of aircraft and its altitude, and the average distance that most multi-engine aircraft appeared on the scopes was from 150 to 175 miles. Average range for jet fighters was from 75 to 100 miles, although when broadside to the station they could be seen at a range of 125 miles.

3.7.1.8.11 During the actual air mission of each test shot, an average of 40 planes were in the air, all within a 30 mile radius and at different altitudes from 5 to 35 thousand feet. These were required to be tracked constantly. On the first mission the set had to be turned off for almost one hour because of interference to the drone aircraft, but upon resuming operation again, tracks were identified by recognition of the predetermined orbits they were flying, and their altitude as determined by the AN/TPS-10 height finder. The added AN/APS-23 cone filler, and the variable antenna tilt angle feature of the AN/FPS-3 also materially aided in the tracking of so many aircraft at such varied altitudes.

3.7.1.8.12 The accuracy with which tracks were called to the plotters depended mainly upon the scope operator's judgment. On the short range setting, for example, a range distance of 10 miles appeared on the scope as slightly over one inch. Angle marks and ten mile range marks were superimposed, and these were held accurate to less than a 500 foot error at 200 miles. If necessary, definite track distance to within one quarter of a mile could be called through the use of an expanded "A" presentation. This type of radar set was never intended to assume the role of a GCA unit but in several instances it did guide aircraft into the station and accurately placed them on their final approach leg.

3.7.2 Air Communications Services, TU 3.4.3.

3.7.2.1 Under this heading is grouped the variety of electrical apparatus which transmits messages, provides navigational aids to aircraft, and in general facilitates the exchange of air intelligence and information. The AACS Task Unit 3.4.3 was organized to furnish these air communications services which included point to point radio CW and RATT, teletype, facsimile, navigational aids, miscellaneous wire, and control tower operations. The air communications equipment was engineered and installed by teams provided by the 1808th AACS Wing prior to the operational phase and included the installation of associated equipment and the erection of antennas.

3.7.2.2 Work was started on 14 August 1950, with the transmitting antenna farm, Figure 75.

3.7.2.3 On 29 November 1950, the transmitter installation (Figures 76, 77, and 78), was completed by the Project Officer except that operating crystals and the inter-connecting cable had not arrived. The receiver installation, Figures 79, 80, 81, and 82, and antenna farm, Figures 83 and 84, were reported as installed and checked except for the non-availability of the operating crystals for the diversity receivers. The Control Tower, Figures 85 and 86, was installed and operating and the VHF/DF equipment, Figure 87, was positioned. The equipment necessary for AACS services to the Weather Central, Figures 88 and 89, was installed with the exception of the facsimile equipment which had not been received. Since the locations of the radar beacon, AN/CPN-6, had not as yet been established, no work in installing this equipment could be undertaken, however, adequate installation personnel with the I&M squadron were detailed to remain for the purpose of making AN/CPN-6 installation at a later date. The power equipment to be installed for emergency standby use for the Control Tower and Receiver Station, Figure 90, and the transmitter building had not arrived. However, with the arrival of the previously missing equipment, the remainder of the installation was completed by maintenance personnel of the AACS Unit before the target date.

3.7.2.4 The installation as projected was similar to that which was in use during the period of peak operation. Some changes were made, such as the removal of two M-15 and one M-19 teletypewriter machines from Task Group Headquarters 3.4 to the AACS Commu-

[redacted]

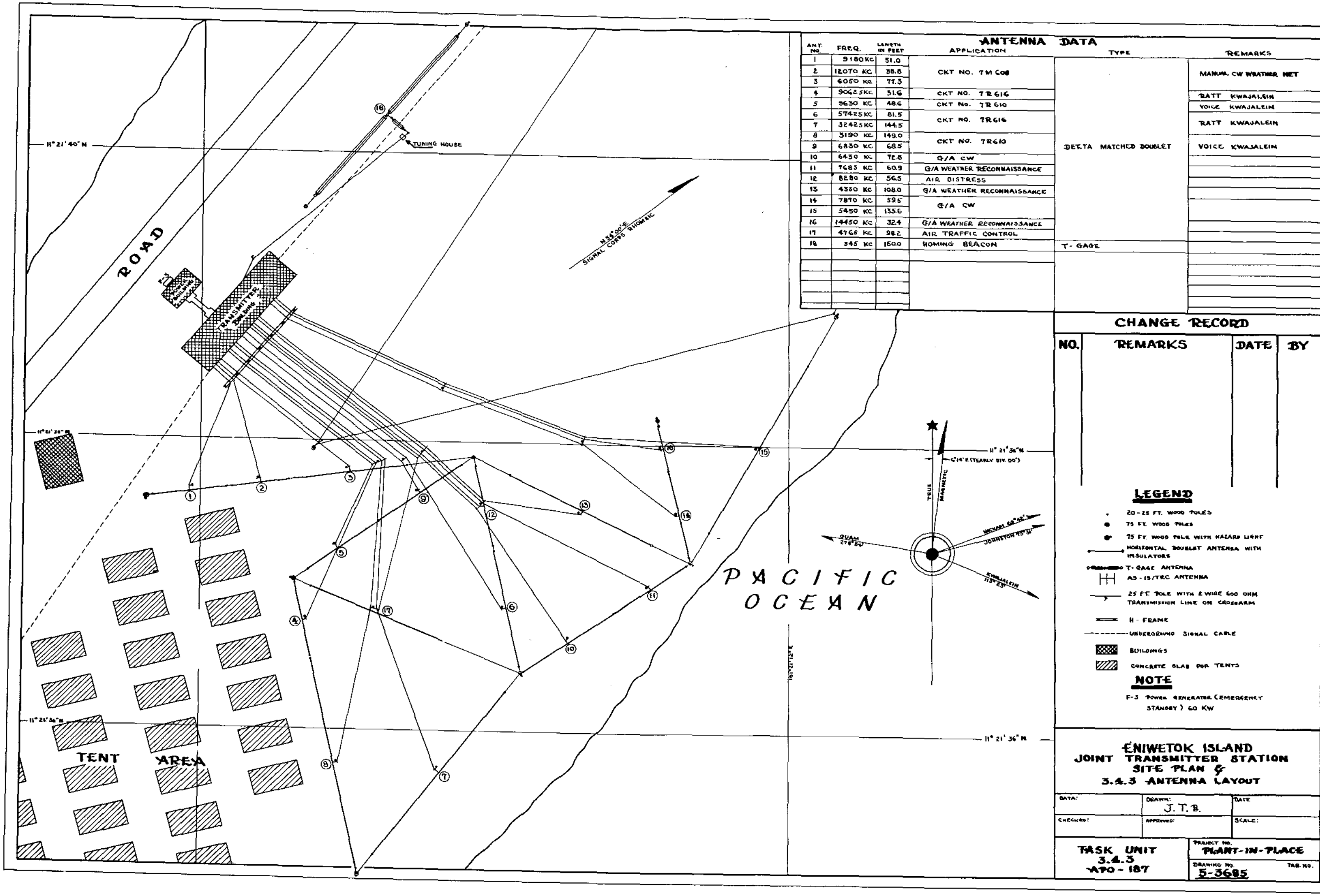


FIGURE 75

[redacted]

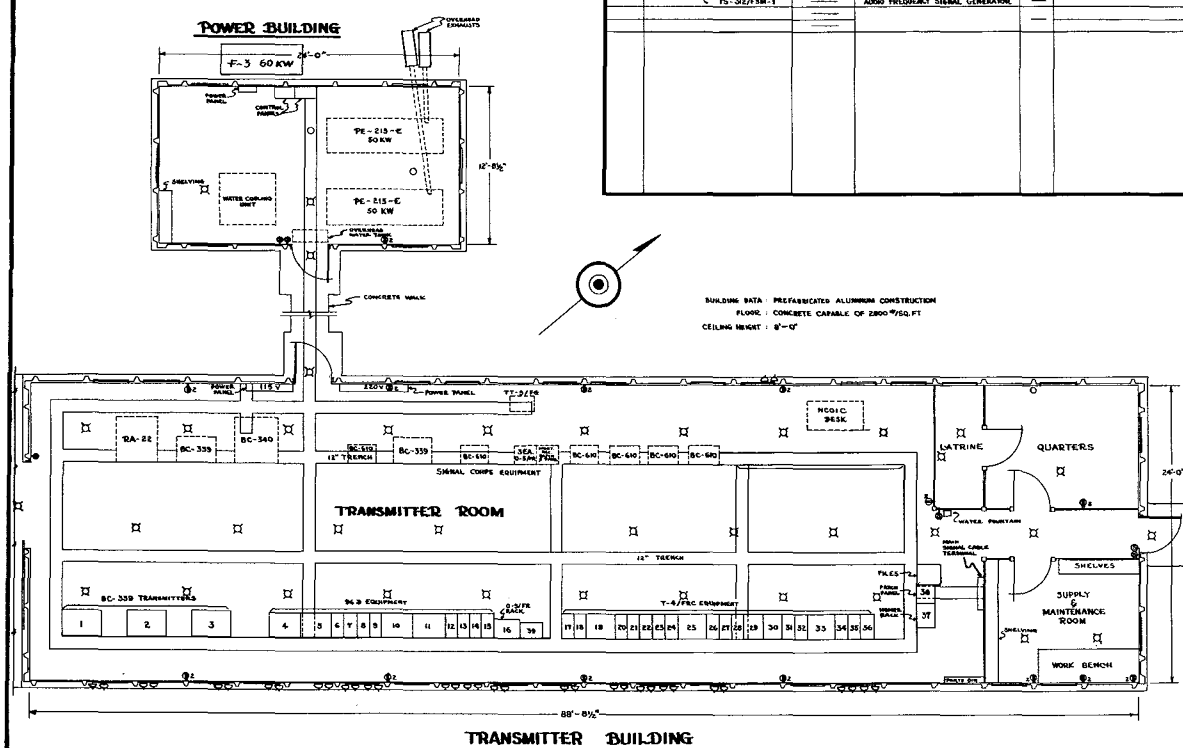
[redacted]

EQUIPMENT DATA

EQUIP. NO.	EQUIP. TYPE	FREQ.	APPLICATION	USED ON ANT. NO.	REMARKS
1		9180 KC		1	
2	3 EA. BC-339	12070 KC	CKT. NO. TM608	2	CW MANUAL WEATHER NET
3		6050 KC		3	
4	MD-69/FRT (WILCOX 50A)	——	MODULATOR	—	~~U/W EQUIP. NO. 6-9~~
5	PP-219/FRT (WILCOX 36A)	——	POWER SUPPLY	—	
6			CKT. NO. TR616	4	KWAJALEIN RADIOTELETYPE CIRCUIT
7	4 EA. T-156B/FRT (WILCOX 96D)	HF	STANDBY	—	
8		3190 KC	CKT. NO. TV610	8	KWAJALEIN VOICE CIRCUIT
9		9630 KC	CKT. NO. TV610	5	KWAJALEIN VOICE CIRCUIT
10	MD-69/FRT (WILCOX 50A)	——	MODULATOR	—	U/W EQUIP. NO. 12-15
11	PP-219/FRT (WILCOX 36A)	——	POWER SUPPLY	—	
12		3242.5 KC	CKT. NO. TR616	7	KWAJALEIN RADIOTELETYPE CIRCUIT
13	4 EA. T-156B/FRT (WILCOX 96D)	5742.5 KC	CKT. NO. TR616	6	KWAJALEIN RADIOTELETYPE CIRCUIT
14		HF	STANDBY	—	
15		6830 KC	CKT. NO. TV610	9	KWAJALEIN VOICE CIRCUIT
16	76" RACK W/4 EA. O-5/FR	——	KWAJALEIN RADIOTELETYPE CIRCUITS	—	
17	T-4/FRC	4765 KC	AIR TRAFFIC CONTROL	7	
18	MD-1/FRC	——	MODULATOR	—	U/W EQUIP. NO. 17, 20, 21, 22
19	PP-1/FRC	——	POWER SUPPLY	—	
20		6430 KC	G/A CW	10	
21	4 EA. T-4/FRC	7695 KC	STANDBY WEATHER RECONNAISSANCE	11	
22		8280 KC	AIR DISTRESS	12	
23		8280 KC	AIR DISTRESS STANDBY	12	
24	MD-1/FRC	——	MODULATOR	——	U/W EQUIP. NO. 25, 29
25	PP-1/FRC	——	POWER SUPPLY	—	U/W EQUIP. NO. 23, 24, 26, 27, 28, 29
26	T-4/FRC	4330 KC	WEATHER RECONNAISSANCE	13	
27	T-4/FRC	7870 KC	AIR ROUTE CW G/A	14	
28	T-4/FRC	HF	STANDBY	—	
29	T-5/FRC	345 KC	HOMING BEACON STANDBY	18	
30	T-5/FRC	345 KC	HOMING BEACON	18	
31	T-4/FRC	HF	STANDBY	—	
32	MD-1/FRC	——	MODULATOR	—	U/W EQUIP. NO. 30
33	PP-1/FRC	——	POWER SUPPLY	—	U/W EQUIP. NO. 30, 31, 32, 34, 35, 36
34		HF	STANDBY	—	
35	3 EA. T-4/FRC	14450 KC	WEATHER RECONNAISSANCE	16	
36		3450 KC	G/A CW	15	
37	76" RACK — O-37/FRT	——	HOMING BEACON TONE OSCILLATOR	—	
		——		—	
	WILSON #22	——	HOMING BEACON IDENTIFICATION KEYER	—	
		——		—	
	BC-22, RA-135	——		—	
	KEYER PANEL	——	HOMING BEACON MODULATION CONTROL	—	
38	BC-779 — EE-8 RA-74	——	MONITOR, RECEIVER & POWER SUPPLY TOWER, DF	—	
	76" RACK — BC-1031-B PATCH PANEL	——	[illegible] VISUAL MONITOR MAIN STATION PATCH PANEL	—	
39	76" RACK	——		—	
		——		—	
	BC-221, RA-133	——	FREQUENCY METER & POWER SUPPLY	—	
	I-134	——	OSCILLOSCOPE	—	
	TS-312/FSM-1	——	AUDIO FREQUENCY SIGNAL GENERATOR	—	
		——		—	
		——			

CHANGE RECORD

NO.	REMARKS	DATE	BY



LEGEND

- EQUIPMENT SUPPLIED BY 3.4.4
- EQUIPMENT SUPPLIED BY SIGNAL CORPS OR OTHERS
- CEILING OUTLET
- DOUBLE CONVENIENCE OUTLET
- SWITCH

NOTES

1. FOR LOCATION OF THIS BUILDING REFER TO DWG. NO. 5-3685.
2. F-3 POWER GENERATOR AS PER TO 19-45-59
3. FIELD PHONE TO TOWER, RECEIVERS & DF

ENIWETOK ISLAND
JOINT TRANSMITTER STATION
FLOOR PLAN &
TU 3.4.3 EQUIPMENT LAYOUT

DATA:	DRAWN: J.T.B.	DATE: 12 MAY 1951
CHECKED:	APPROVED:	SCALE: ¼" = 1'-0"

TASK UNIT 3.4.3
APO-187

PROJECT NO.: FLOAT-IN-PLACE
DRAWING NO.: 5-3686

FIGURE 76

[redacted]

[redacted]

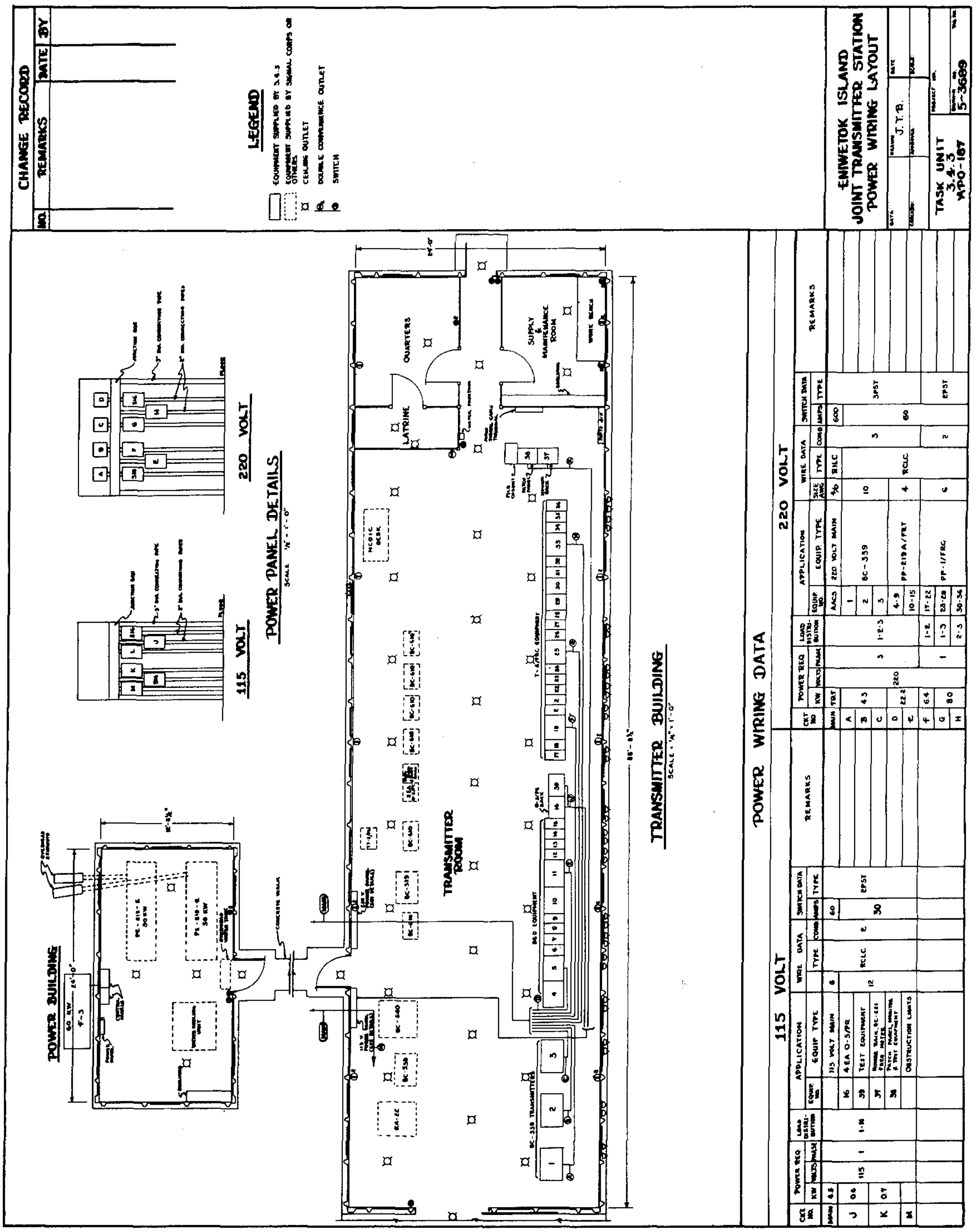


FIGURE 77

[redacted]

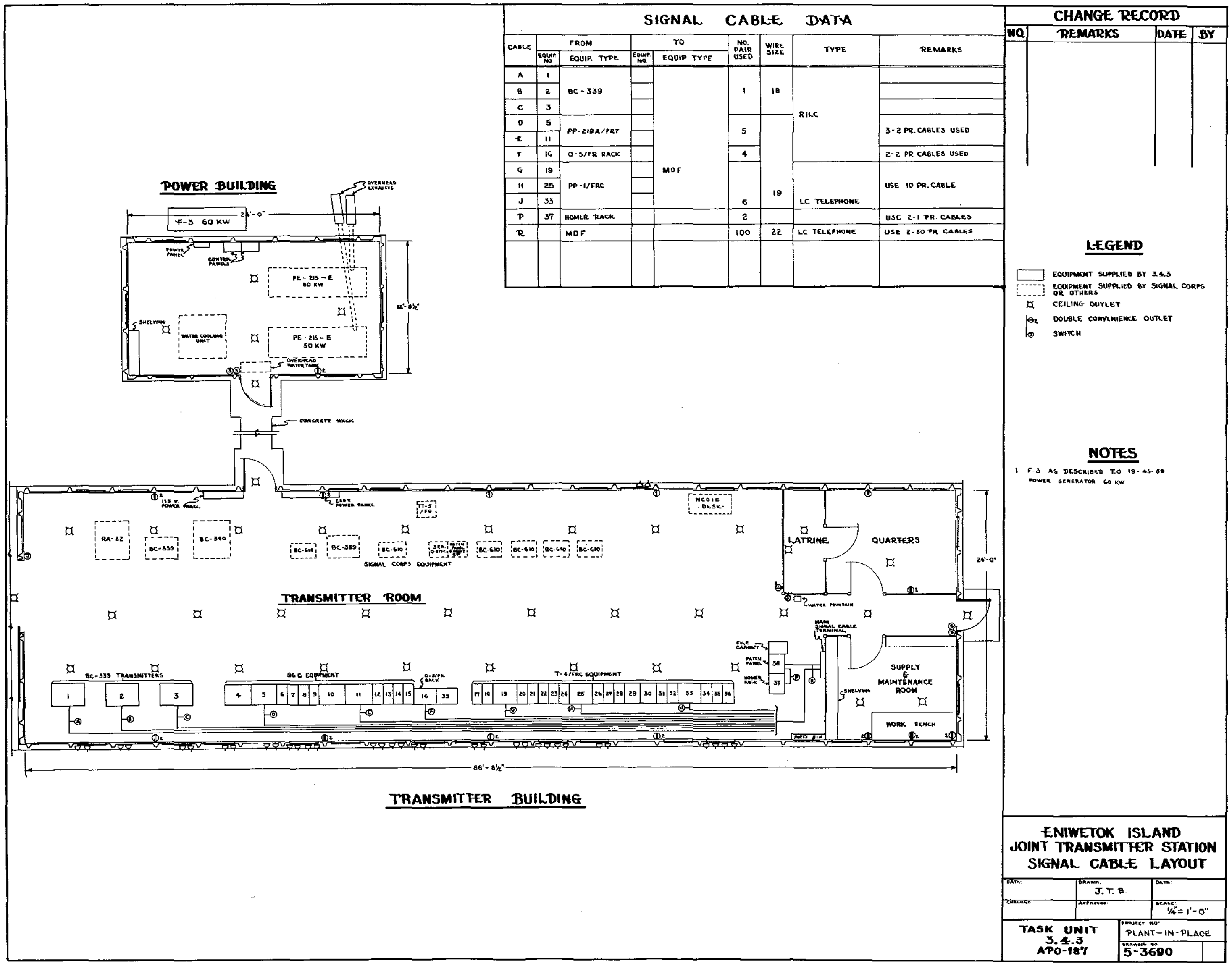

SIGNAL CABLE DATA
CABLE | FROM EQUIP NO | FROM EQUIP. TYPE | TO EQUIP NO | TO EQUIP TYPE | NO. PAIR USED | WIRE SIZE | TYPE | REMARKS
A | 1 | BC-339 | | MDF | 1 | 18 | RILC |
B | 2
C | 3
D | 5 | PP-21PA/FRT | | | 5 | | | 3-2 PR. CABLES USED
E | 11
F | 16 | O-5/FR RACK | | | 4 | | | 2-2 PR. CABLES USED
G | 19 | PP-1/FRC | | | 6 | 19 | LC TELEPHONE | USE 10 PR. CABLE
H | 25
J | 33
P | 37 | HOMER RACK | | | 2 | | | USE 2-1 PR. CABLES
R | | MDF | | | 100 | 22 | LC TELEPHONE | USE 2-50 PR. CABLES
CHANGE RECORD
NO. | REMARKS | DATE | BY
LEGEND
EQUIPMENT SUPPLIED BY 3.4.3
EQUIPMENT SUPPLIED BY SIGNAL CORPS OR OTHERS
CEILING OUTLET
DOUBLE CONVENIENCE OUTLET
SWITCH
NOTES
1. F-3 AS DESCRIBED T.O 19-45-60 POWER GENERATOR 60 KW.
POWER BUILDING
F-3 60 KW
PE-215-E 80 KW
PE-215-E 50 KW
WATER COOLING UNIT
CONCRETE WALK
TRANSMITTER ROOM
LATRINE
QUARTERS
SUPPLY & MAINTENANCE ROOM
WORK BENCH
BC-339 TRANSMITTERS
94 C EQUIPMENT
T-4/FRC EQUIPMENT
SIGNAL CORPS EQUIPMENT
TRANSMITTER BUILDING
ENIWETOK ISLAND
JOINT TRANSMITTER STATION
SIGNAL CABLE LAYOUT
DRAWN: J. T. B.
SCALE: 1/4" = 1'-0"
TASK UNIT 3.4.3 APO-187
PLANT-IN-PLACE
5-3690

FIGURE 78

[redacted]

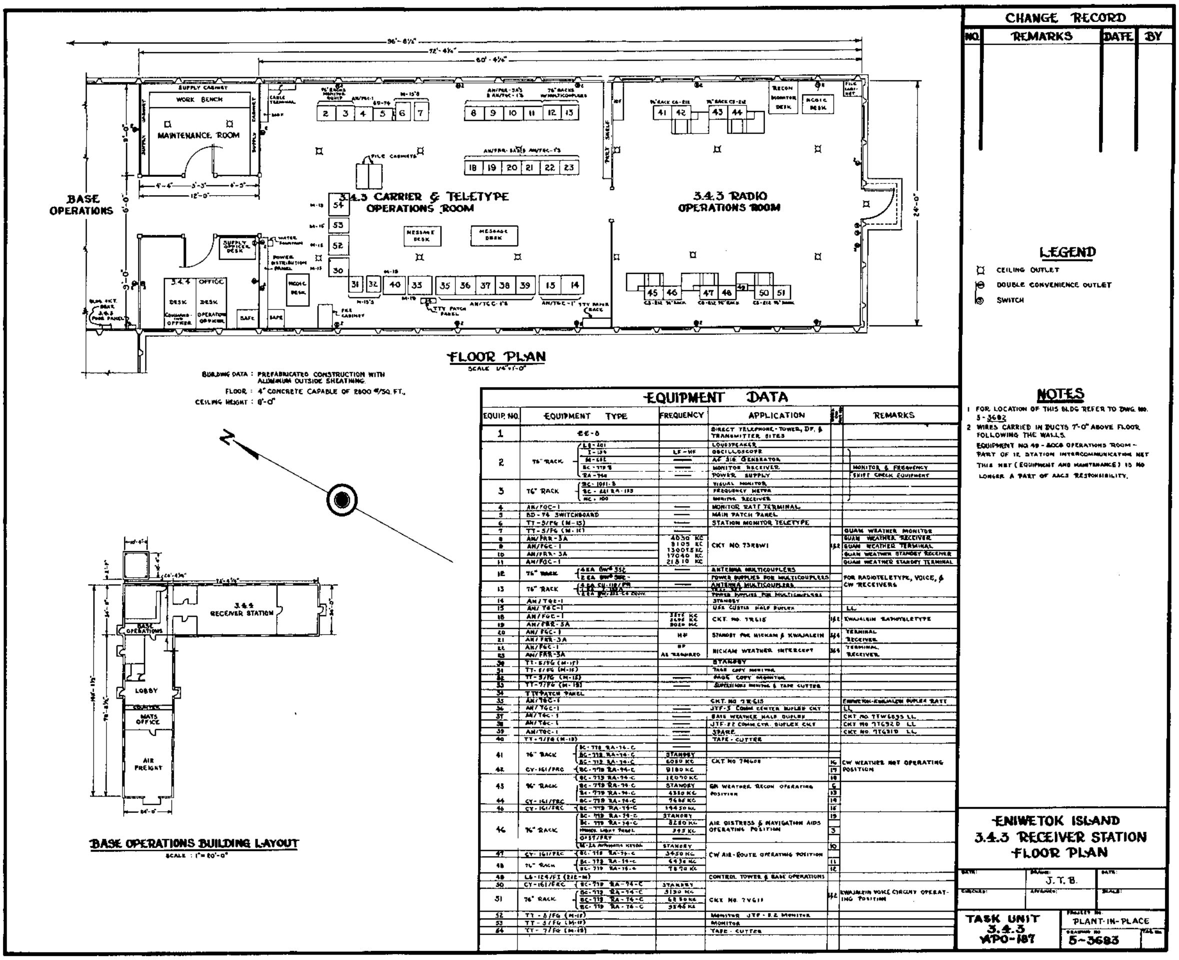


FIGURE 79

nications Center for the purpose of more efficient operation.

3.7.2.5 After it was determined that the I&M team was no longer needed the installation was taken over by the AACS operating personnel. Adjustments were necessary by the maintenance personnel primarily due to the fact that crystals requisitioned for the operating frequencies were delayed in their shipment to this station. Also, a more efficient arrangement of the message center was planned for the accomplishment of the AACS mission. With the disposition of these final matters, operation of the AACS facilities was carried on with a minimum of difficulties.

3.7.2.6 In accordance with TB Sig 178, Technical Bulletins and Manuals, a program of scheduled preventive maintenance was inaugurated. This schedule, rigorously followed, served to keep equipment outage to a minimum. In addition to having skilled technicians available to make repairs in instances of unforeseen equipment failures, spares and standbys were available for use when necessary. A breakdown of the spare equipment follows:

Transmitters 96D	200% spares
Diversity Receivers	150% spares
Teletypewriters (M-19)	50% spares
Teletypewriters (M-15)	10% spares
Teletype Package Unit (AN/TGC-1)	40% spares
CW Receivers	30% spares

3.7.2.7 Adequate equipment was provided in original plans for the installation. However, this refers only to operating equipment and spares to assist in maintaining the equipment to a high degree of efficiency. The test equipment was inadequate in maintaining all facilities. This condition existed throughout the operation. In addition, the housing facil-

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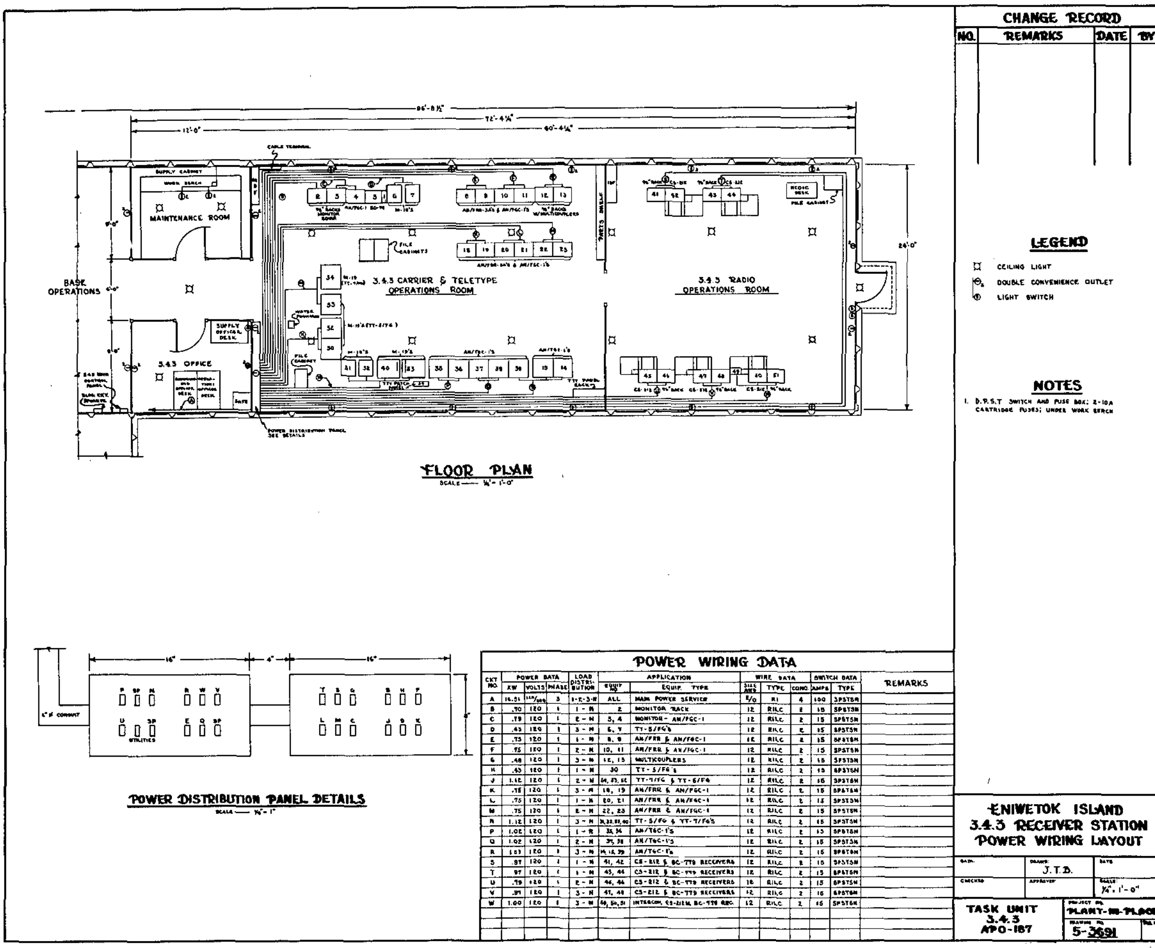

FIGURE 80

ities provided for maintenance shops were not large enough in area to perform the maintenance which AACS was required to accomplish.

3.7.2.8 In the Receiver Station all teletype and radio maintenance was crowded into one small maintenance shop. No more than two technicians were able to work simultaneously.

3.7.2.9 In operating the AACS maintenance sections, it was found that sufficient personnel had been allocated. In addition to maintenance work, it was necessary to make other installations, such as runway lighting system, interior electrical wiring of buildings, and power distribution for Task Group 3.4.

3.7.2.10 There were no unusual or unforeseen demands on repair personnel in any of the problems which have been encountered. The inadequacy of the maintenance shop facilities was overcome through the rigid adherence to preventive maintenance schedules. Active supervision by key personnel kept the conflict of personnel using work shop facilities and test equipment to a minimum. Also, repair of equipment with top priority was undertaken promptly while repairs for equipment, which had adequate back-up, were undertaken at the most convenient time. It was seldom necessary to make use of repair facilities outside the unit. However, in some cases, when it was found necessary to do so, the facilities available were adequate in all respects.

3.7.2.11 The majority of equipment which was procured for this project arrived in good condition. In some cases equipment arrived in such a condition as to need repairs, but sufficient time was available to place equipment in operating condition. Thus it was

[redacted]

[redacted]

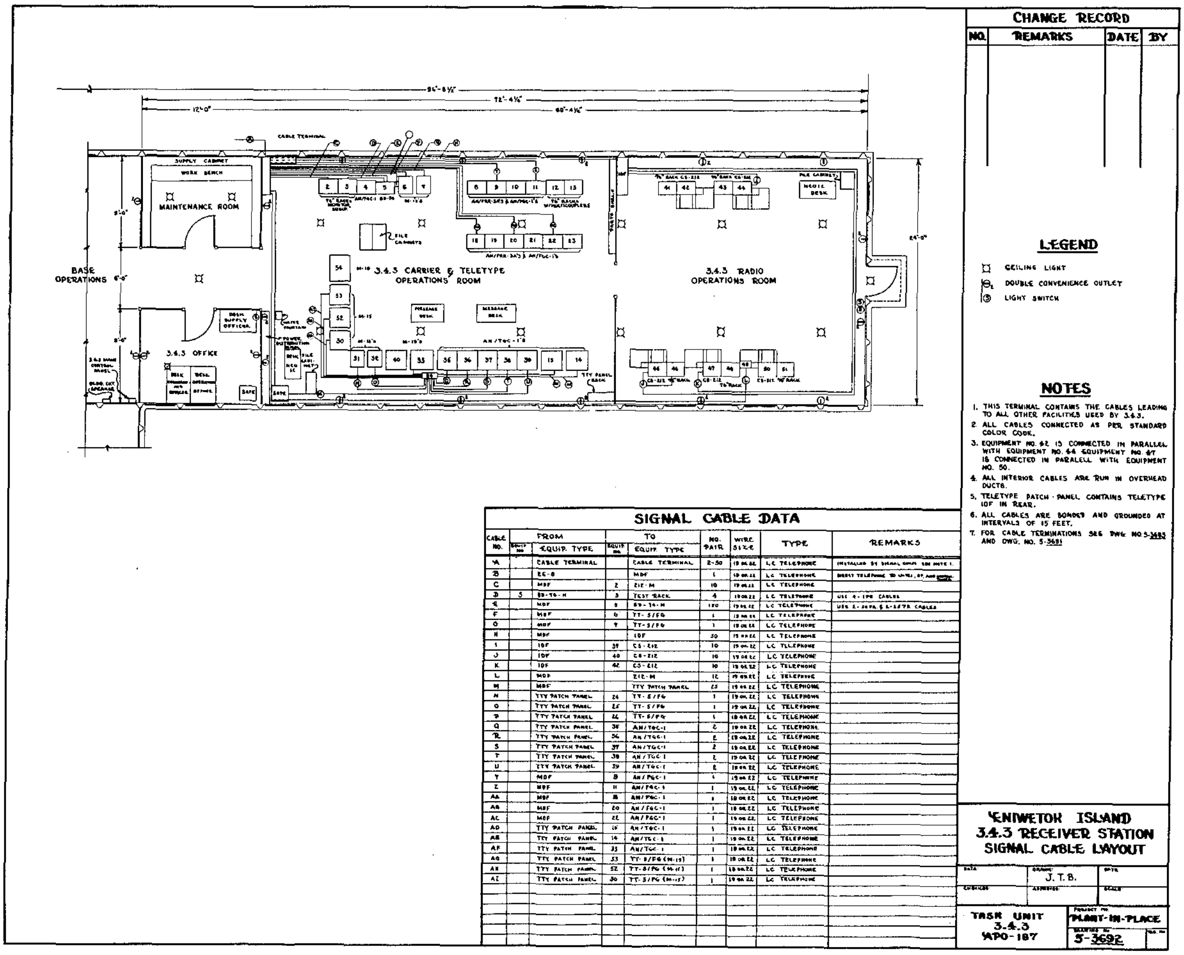

FIGURE 81

found to be advantageous to procure equipment as far in advance of the operational date as was possible.

3.7.2.12 The transmitting equipment used for the CW weather net was the BC–339. Transmitters Wilcox 96D, were used for radio teletype and CW operation. The transmitting equipment T–5/FRC was utilized as a low frequency homer. Transmitters BC–640, BC–639, and T–151/CRT5, were used for control tower operation. Signal Corps Radio equipment SCR 575 operated as a mobile VHF/DF. During full-scale operation, 40% operating load was maintained. However, the equipment was adequate for maximum load operation.

3.7.2.13 This equipment operated under normal tropical climatic conditions on a twenty-four hour schedule. All equipment which operated during peak load was suitable for the mission of this unit. Inasmuch as the distance between the transmitter building and the receiver station was no more than approximately one mile, it was found unnecessary to install the AN/TRC equipment for back-up, especially with the installation of direct telephone lines between DF, Control Tower, Receivers, and Transmitters.

3.7.2.14 There were no special problems encountered with the transmitting equipment which was employed normally for this type of installation. However, transmitter failures were experienced due to the action of prevailing winds from the ocean side of the island. These winds, during driving rainfalls, caused the seepage of water into the transmitter building and into the blowers of the rectifier for the 96D transmitters. As a result, arcing and power amplifier plate by-pass capacitor failures occurred. This was remedied by the

[redacted]

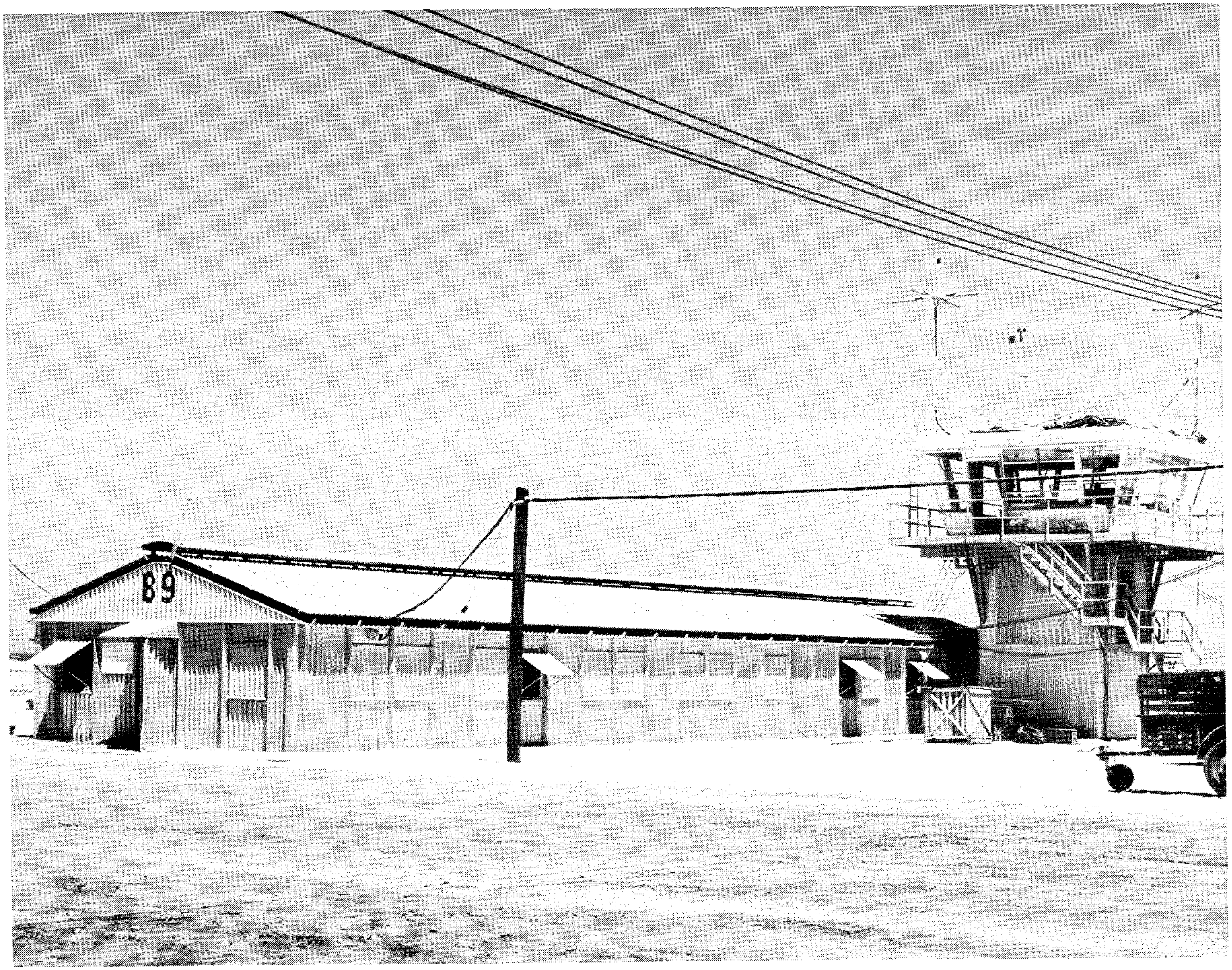

FIGURE 82. ATG 3.4 Receiver Station and Control Tower, Eniwetok Island

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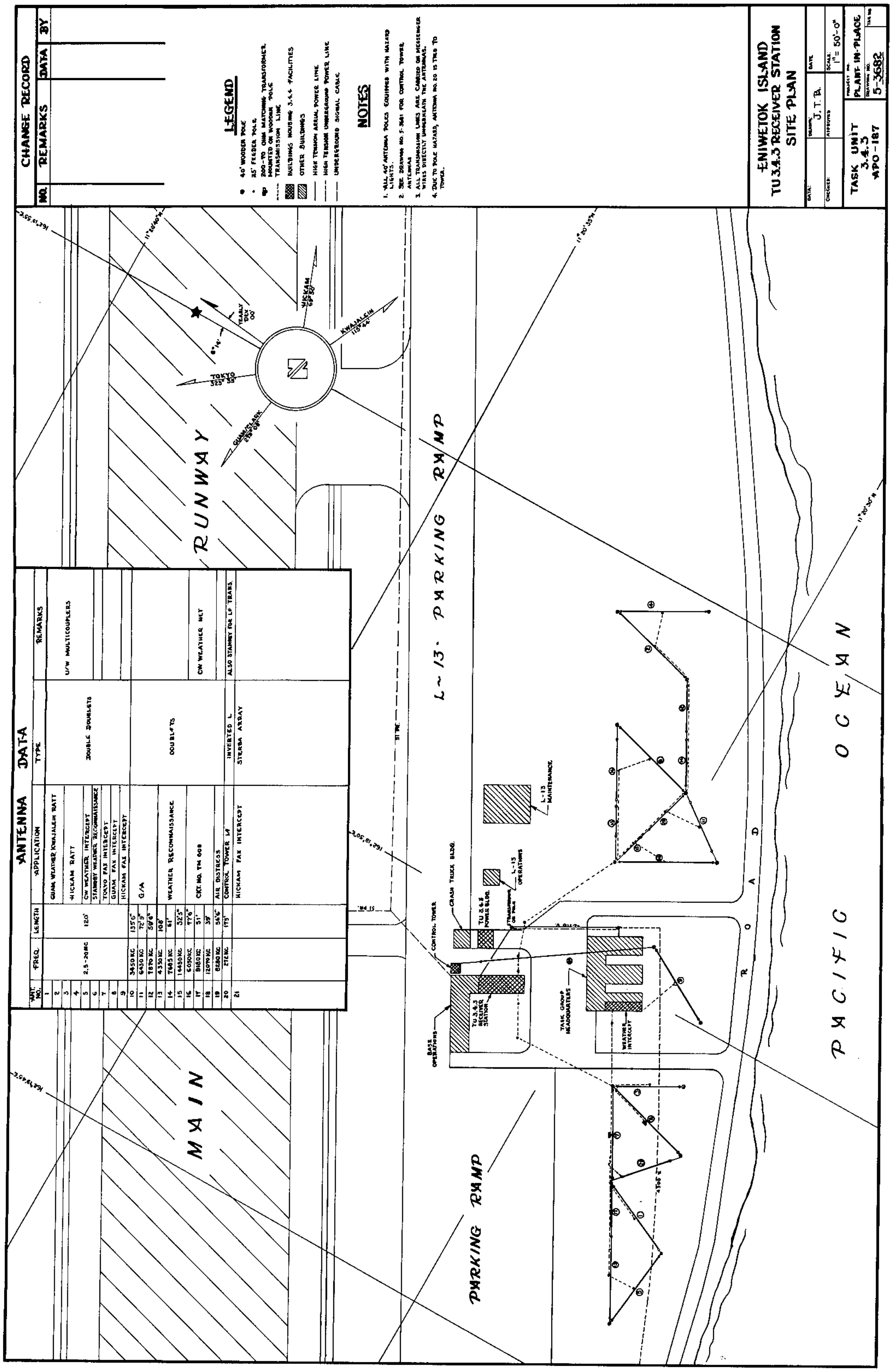


FIGURE 83

[redacted]

[redacted]

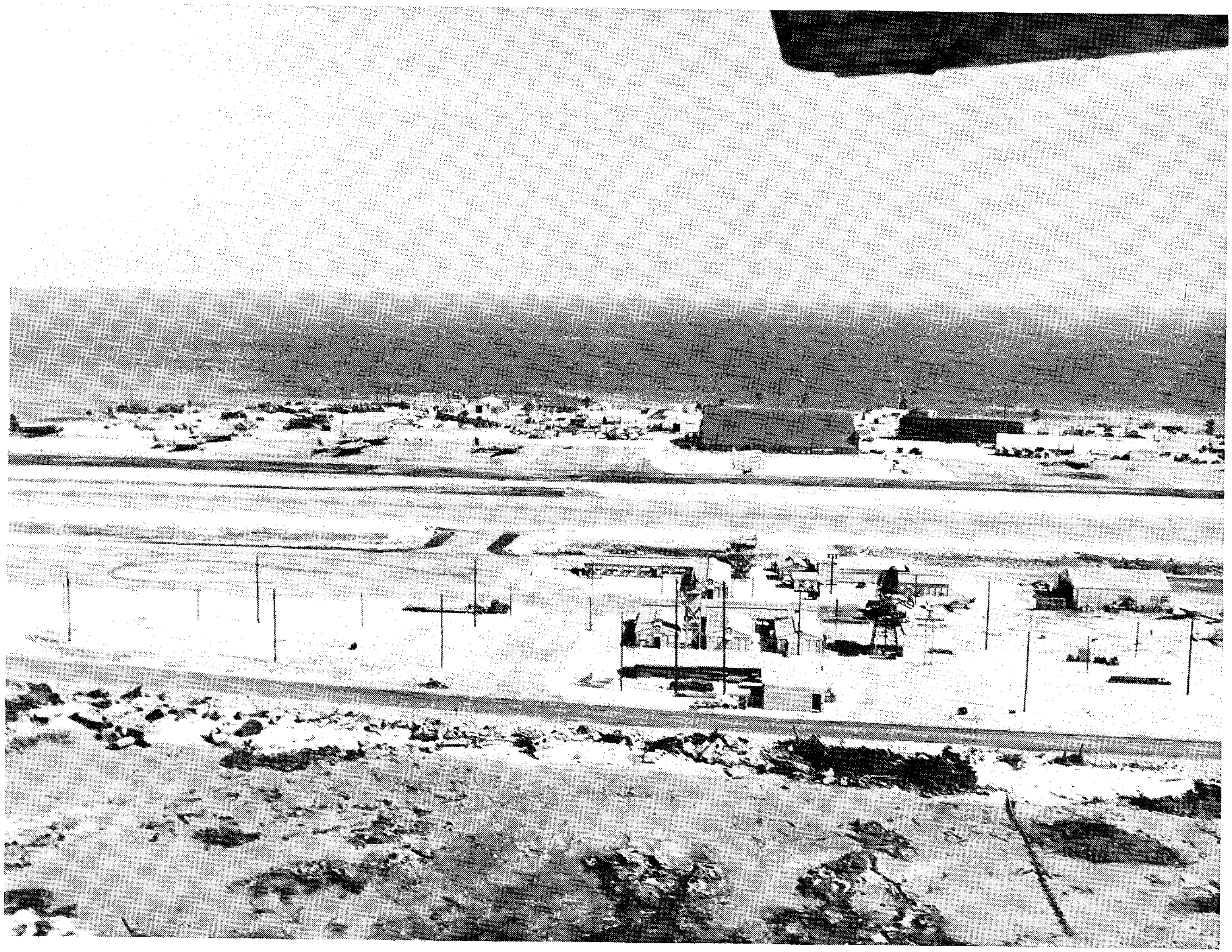
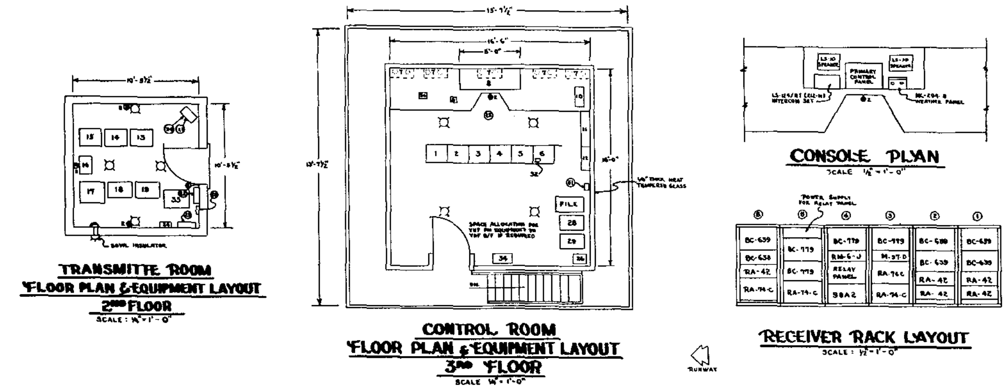
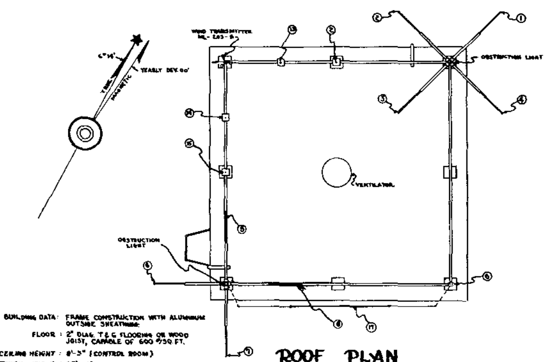


FIGURE 84. ATG 3.4 Receiving Antenna Farm Eniwetok Island (foreground)

[redacted]



EQUIP. NO.	EQUIP. TYPE		FREQ.	APPLICATION	ANTENNA TYPE	ANTENNA NO.	REMARKS
1	42" RACK	BC-639	135.9 MC	VHF G/A RECEIVER	RC-81	4	
		BC-639	TACT VHF			3	
		RA-42		BC-639 POWER SUPPLY			
		RA-42					
2	42" RACK	BC-639	126.18 MC	VHF-G/A RECEIVER	RC-81		
		BC-639	121.5 MC			2	
		RA-42		BC-639 POWER SUPPLY		1	
		RA-42					
3	42" RACK	BC-779	6500 KC.	HF G/A RECEIVER	18' WHIP	15	
		M-561-B		SPEECH UNIT AMPLIFIER			
		RELAY PANEL		CONTROL CIRCUITS STANDBY			
		RA-94-C		BC-779 POWER SUPPLY			
4	42" RACK	BC-779	SPARE	H.F. G/A RECEIVER	18' WHIP	14	
		RM-6-J		SPEECH UNIT STANDBY			P/O BC-329
		RELAY PANEL		CONTROL CIRCUITS			
		RA-94-C		BC-779 POWER SUPPLY			
5	42" RACK	POWER SUPPLY FOR RELAY PANEL					
		BC-779	4965 KC	H.F. G/A RECEIVER			
		BC-779, RA-94-C	272 KC	MONITOR RECEIVER WITH POWER SUPPLY			
6	42" RACK	BC-639	100-156 MC	VHF STANDBY RECEIVER			
		BC-638		VHF FREQUENCY METER			
		RA-42		BC-639 POWER SUPPLY			
		RA-94-C		BC-779 POWER SUPPLY			SUPPLIES BC-779 IN RACK #5
7	5 EA. DUAL SPEAKER PANELS			RECEIVER OUTPUTS			
8	CONTROL CONSOLE	PRIMARY CONTROL PANEL EQUIVALENT		TRANSMITTER & RECEIVER CONTROL			
				POWER SUPPLY FOR RELAYS			24 V D.C.
		ML-204-B		WEATHER PANEL			P/O AN/GMQ-1
		6" SPEAKER LS-10		CONSOLE SPEAKER			
		LS-1248/F2 (212-M)		INTERCOM			
		LS-10		SPEAKER FOR SCR-522			
9	EE-8-B			DIRECT TELEPHONE BASE OPS & ... UNIT			
10	AN/UNQ-2			G/A RECORDER			
11	MAIN DISTRIBUTION FRAME						
12	SIGNAL CABLE TERMINAL						
13	BC-640		121.5 MC	G/A VHF TRANSMIT	RC-81	6	
14	BC-640		126.18 MC			5	
15	BC-640		135 MC			8	
16	AN/CRT-5		272 KC	L.F. STANDBY TRANSMITTER			ANT. NO. 20 OF DWG. NO. 5-3682
17	BC-329		272 KC	CONTROL TOWER L.F TRANSMITTER			ANT NO. 20 OF DWG. NO. 5-3682
18	BC-640		135.9 MC	G/A VHF TRANSMIT			
19	BC-640		TACT VHF		RC-81	7	
20	BC-624 & BC-625 & BC-1312		100-156 MC	VHF STANDBY	AN-94-A	16	SCR-522
21	RA-62-B			RECTIFIER			
22	SIGNAL CABLE TERMINAL			SIGNAL CABLE FROM CONTROL ROOM			
23	SERVICE DISTRIBUTION PANEL			POWER DISTRIBUTION			TOWER TRANSMITTERS
24	LIGHTING PANEL						LIGHTING & RECEIVERS
25	LIGHT, AIR TRAFFIC CONTROL			LIGHT GUN FOR RUNWAY TRAFFIC CONTROL			
26	REGULATOR, CONSTANT-CURRENT TYPE C-1, 4 KW			TAXIWAY LIGHTING			
27							
28	AN 2572-1			PANEL-TYPE II LIGHTING CONTROL			
29	TAXI LIGHTS PANEL SWITCH			SWITCH FOR TAXIWAY LIGHTS			
30	EE-8			DIRECT TELEPHONE - AGC. STATION ...			
31	EE-8			DIRECT TELEPHONE TO HOSPITAL			
32	EE-8			DIRECT TELEPHONE TO ...			
33	GE-MODEL 6RC-135-1			COPPER OXIDE RECTIFIER			
34	BC-603-D & BC-604-D		27.9 MC	RADIO COMM. WITH CRASH TRUCKS			



BUILDING DATA: FRAME CONSTRUCTION WITH ALUMINUM OUTSIDE SHEATHING
FLOOR: 2" DUAL T.& G. FLOORING ON WOOD JOIST, CAPABLE OF 600-750 FT.
CEILING HEIGHT: 8'-3" (CONTROL ROOM)
TOWER HEIGHT: 27'-0"
OVERALL TOWER HT. WITH ANTENNAS: 36'-0"

ANTENNA DATA

ANT. NO.	FREQUENCY	LENGTH IN FT.	APPLICATION	TYPE	REMARKS
1	126.18 MC	—	AIRCRAFT CONTROL RECEIVE & TRANSMIT	RC-81	MOUNTED 11' ABOVE TOWER ROOF
2	121.5 MC	—			
3	TACT VHF	—			
4	136 MC	—			
5	126.18 MC	—			
6	121.5 MC	—			
7	TACT VHF	—			
8	135.9 MC	—			
12	272 KC	18	LF A/G MONITOR RECEIVE	WHIP	
13	4965 KC	18	A/G RECEIVE		
14	6500 KC	18	HF A/G RECEIVE		
15	4500 KC	18	A/G RECEIVE SPARE		
16	1359		VHF STANDBY	AN-34-A	
17	27.9	8	RADIO COMM. W/ CRASH		INVERTED "L" TYPE, MOUNTED 6' ABOVE TOWER ROOF

CHANGE RECORD

NO.	REMARKS	DATE	BY

LEGEND

- CEILING OUTLET
- DOUBLE CONVENIENCE OUTLET
- SWITCH

NOTES

1. FOR LOCATION OF CONTROL TOWER SEE DWG NO. 5-3682.

ENIWETOK ISLAND
3.4.3 CONTROL TOWER
FLOOR PLAN & ROOF PLANS

DRAWN: J.T.B.
APPROVED:
SCALE:

TASK UNIT 3.4.3 APO-187
PROJECT NO. PLANT-IN-PLACE
DRAWING NO. 5-3681

FIGURE 85

FIGURE 86. ATG 3.4 Aircraft Control Tower, Eniwetok Island

FIGURE 87. Mobile VHF/DF Equipment, Eniwetok Island

[redacted]

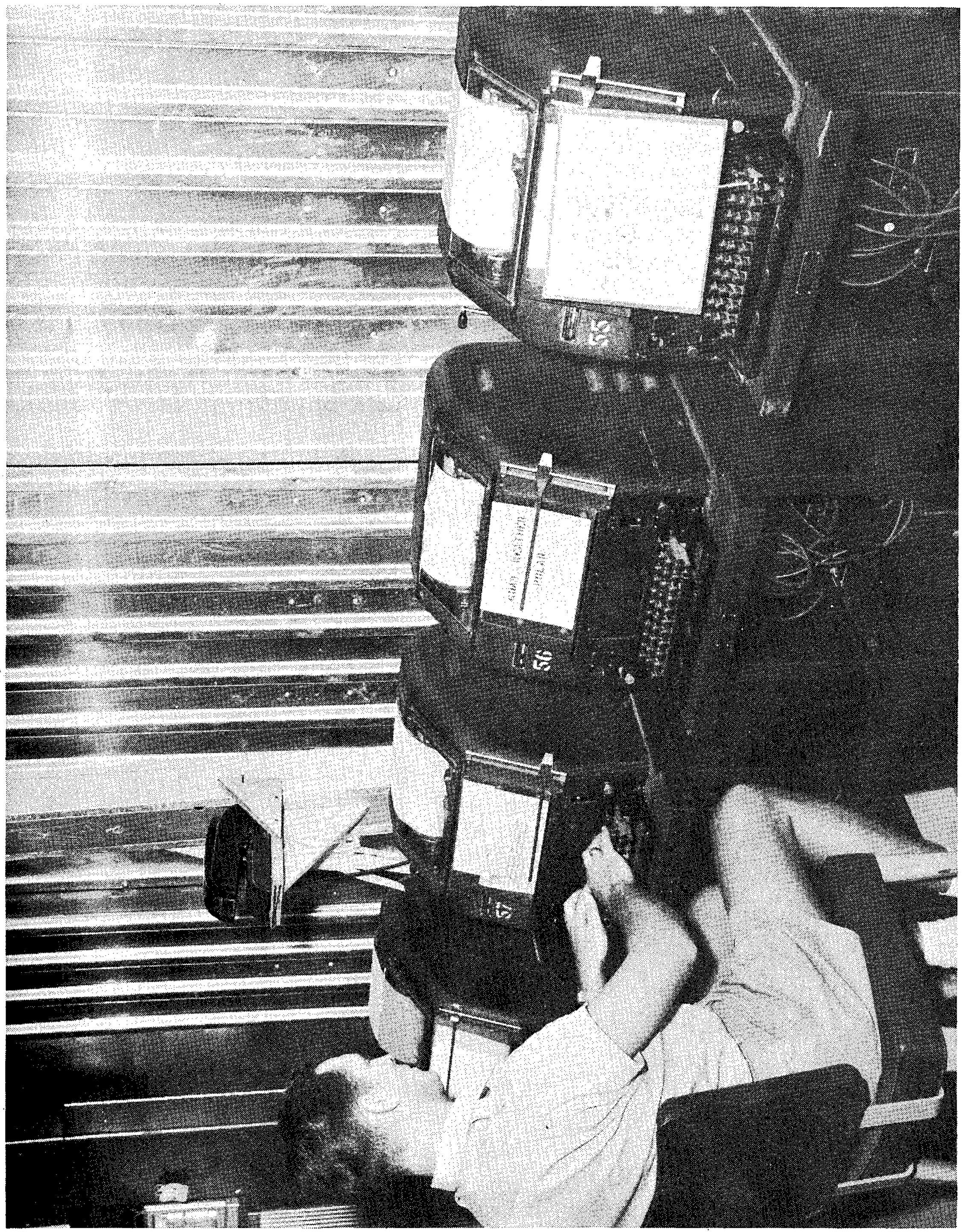


FIGURE 88. AACS Weather Central Teletype Facilities, Eniwetok Island

[redacted]

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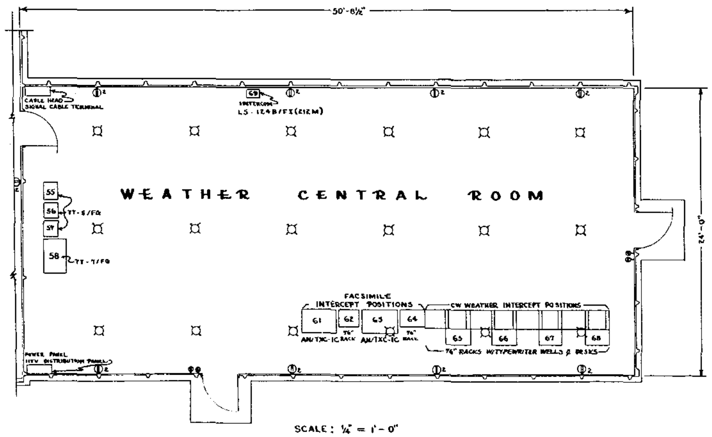


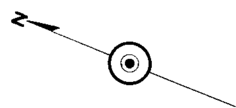
SCALE: ¼" = 1'-0"

BUILDING DATA

CONSTRUCTION: PREFABRICATED CONSTRUCTION WITH ALUMINUM OUTSIDE SHEATHING

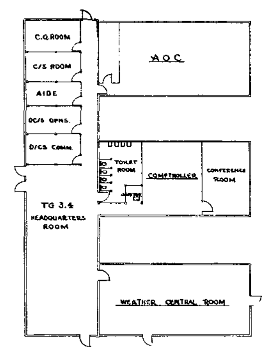
FLOOR: 4" CONCRETE, CAPABLE OF 2800 #/SQ FT.

CEILING HEIGHT: 8'-0"



EQUIPMENT DATA

EQUIP. NO.	EQUIP. TYPE	FREQ.	APPLICATION	USED ON ANT NO	REMARKS
55	TT-5/FG (M-15)		HICKAM WEATHER		
56			WEATHER STANDBY		
57			CKT. NO. 73RBWI GUAM WEATHER		
58	TT-7/FG (M-19)		CKT. NO. 7TW6895		TO AACS OPERATIONS
61	AN/TXC-1C & CV-2A/TX		HICKAM OR TOKYO FACSIMILE INTERCEPT		FACSIMILE RECORDER & CONVERTER
62	76" RACK – 2 EA. BC-779, RA-74'S	2.5-20 MC	FACSIMILE INTERCEPT RECEIVERS	9	HICKAM
	1 EA. BC-221, RA-133'S		BEAT OSCILLATORS		U/W BC-779'S FOR FREQ. SHIFT FAX.
	TS-512/FSM-1		AF SIGNAL GENERATOR		TO MEASURE BEAT FREQUENCY
	I-134		OSCILLOSCOPE		ADJUSTMENT
63	AN/TXC-1C & CV-2A/TX		TOKYO OR HICKAM FACSIMILE INTERCEPT		FACSIMILE RECORDER & CONVERTER
64	76" RACK – 2 EA. BC-779, RA-74'S	2.5-20 MC	FACSIMILE INTERCEPT RECEIVERS	7	TOKYO
	1 EA. BC-221, RA-133'S		BEAT OSCILLATORS		U/W BC-779'S FOR FREQ. SHIFT FAX.
	TS-312/FSM-1		AF SIGNAL GENERATOR		TO MEASURE BEAT FREQ. ADJUSTMENT
	I-134		OSCILLOSCOPE		TO MEASURE BEAT FREQ. ADJUSTMENT
65	76" RACK – 1 EA. CU-119 A/FR		4 EA. CW WEATHER INTERCEPT POSITIONS	5	
	BC-779-RA-74-C	2-20 MC			
	BC-779-RA-74-C	2-20 MC			
	1 EA. BU-352 EQUIV.				
	TYPEWRITER WELL & DESK				
66	76" RACK – 1 EA. CU-119 A/FR			5	
	BC-779-RA-74-C	2-20 MC			
	BC-779-RA-74-C	2-20 MC			
	1 EA. BU-352 EQUIV.				
	TYPEWRITER WELL & DESK				
67	76" RACK – BC-779, RA-74-C	2-20 MC		5	
	BC-779, RA-74-C				
	TYPEWRITER WELL & DESK				
68	76" RACK – BC-779, RA-74-C	2-20 MC		5	
	BC-779, RA-74-C				
	TYPEWRITER WELL & DESK				
69	LS-124B/FI (212M) INTERCOM		OPERATIONS NET		



TASK GROUP 3.4 HEADQUARTERS BUILDING

SCALE: 1/16" = 1'-0"

CHANGE RECORD			
NO.	REMARKS	DATE	BY

LEGEND

- ⌑ CEILING OUTLET
- DOUBLE CONVENIENCE OUTLET
- LIGHT SWITCH

NOTES

1. FOR LOCATION OF HEADQUARTERS BUILDING SEE DWG. NO. 5-3682
2. ALL WIRES ARE CARRIED IN OVERHEAD DUCTS.
3. INTERCOMM EQUIPMENT AND MAINTENANCE NO LONGER 3.4.5 RESPONSIBILITY

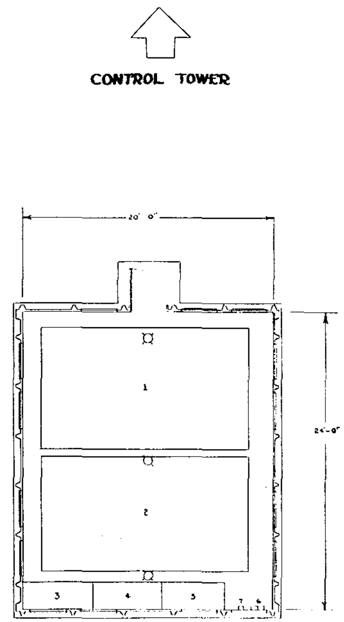
ENIWETOK ISLAND WEATHER CENTRAL 3.4.3 EQUIPMENT DATA FLOOR PLAN

DATA: | DRAWN: J. T. B. | DATE:
CHECKED: | APPROVED: | SCALE:

TASK UNIT 3.4.3 APO-187 | PROJECT NO. PLANT-IN-PLACE | DRAWING NO. 5-3688

FIGURE 89

[redacted]



BUILDING : STEEL FRAME CONSTRUCTION WITH ALUMINUM OUTSIDE SHEATHING.
FLOOR : 4" CONCRETE CAPABLE OF 2800 #/SQ FT
CEILING HEIGHT : 9'-0"

EQUIPMENT DATA

NO	TYPE		APPLICATION	REMARKS
1	BARDCO POWER PLANTS 62 KVA 50KW TYPE C-12		HIGH INTENSITY RUNWAY LIGHTING SYSTEM	
2	BARDCO POWER PLANTS 62 KVA 50KW TYPE C-12		EMERGENCY POWER FOR C.T. AND RCVRS BLDGS	
3	REGULATOR, CONSTANT CURRENT			
4	RUNWAY LIGHTING, TYPE C-3			
5	15 KW			
6	3 POLE D.T. SWITCH 100 A		SWITCH FOR EMERGENCY POWER TO CONTROL TOWER & RECEIVERS BUILDING	
7	LIGHT SWITCH			

CHANGE RECORD

NO.	REMARKS	DATE	BY

LEGEND

¤ CEILING HEIGHT

NOTES

1. POWER BUILDING UNDER CENTRALIZED 3.4 CONTROL FOR MNTC & OPERATION

ENIWETOK ISLAND
3.4.3 RECEIVER STATION
POWER BUILDING
FLOOR PLAN

DATA	DRAWN J.T.B.	DATE
CHECKED	APPROVED	SCALE 1/4" = 1'-0"

TASK UNIT 3.4.3 APO-187 — PROJECT NO. PLANT-IN-PLACE — DRAWING NO. 5-3684

FIGURE 90

use of a large section of heavy canvas on the wall to keep the seepage to a minimum.

3.7.2.15 No long-range transmitting operations were conducted. The only long-range receiving operations conducted were Guam WX Intercept, Tokyo Facsimile Intercept, and the Hickam Facsimile Circuit. Due to the fact that the facsimile equipment arrived at a late date, adequate time for testing was not available before required. Consequently, the efficiency of this circuit was not at a level with that of the operation as a whole. As a result of tests and trials wherein the circuit was continuously improved, outage time was reduced to a low level and by May, fifteen hours of readable charts from 3 to 5 plus were being copied.

3.7.2.16 The antennas used for all transmitters were delta-matched cut to frequency. In the case of the low frequency homing beacon, a "T" cage type antenna was installed. The receiver station antenna field consisted entirely of doublet, receiving type antennas with the exception of one Sterba array which was erected for use on the Hickam Facsimile circuit. Antenna couplers, CU119A/FR, were used for coupling the doublets to the various receivers.

3.7.2.17 For the transmitter building an F-3 60 KW power generator was installed and for the receiver and tower building two Bardco C-12 50 KW power generators were used. Two Power Units PU 58 were used at the VHF/DF for power to the SCR-575. No difficulty was experienced with power units and no outage was due to failure of power equipment.

3.7.2.18 Wire and cable in sufficient quantities were procured to meet the needs of all installations and maintenance. In the case of the Bardco power installation for emergency power to receivers and tower building, it was necessary to use approximately 1,000 feet of No. 6 TW wire to carry the load. By using telephone lines installed by the Signal Corps and the cable laying teams of TG 3.2, the remotely controlled units were installed with little difficulty. The original installation and all splicing, pole-setting, insulating, etc., was handled by the I&M team from Hq, 1808th AACS Wing.

3.7.2.19 For patching equipment, a BD-74 was installed at the receiver station and similar equipment improvised for the transmitter station. These units were well located so as to be easily accessible. Instead of using only line and equipment jacks, it would be more convenient to use a monitor position jack in order to check out circuits without causing garbling or opening the circuit.

3.7.2.20 Remote control systems gave satisfactory service. This was true between the control tower and transmitter station; between receiver stations, and transmitters stations; and between control tower and VHF/DF installation. To change channels on the 96D transmitting equipment from the receiver station, a dial system similar to the telephone dial system was used. This system was also used for keying and modulating the transmitter at the discretion of the radio operator. This system proved most convenient. No difficulties were experienced with the various types of speakers used.

3.7.2.21 When installations were found to be necessary, there was an adequate supply of installation equipment available. Sufficient tool kits were available and installation supplies proved adequate. This was true for the majority of installations; however, where it was found that certain types of equipment could facilitate the work of installation, other units of the island could be successfully approached for the use of special tools.

3.7.2.22 Test equipment, Figure 91, was available for use at all times. In certain instances there was a shortage in types of test equipment. One type was alignment generators of radio frequency type. However, in place of this, frequency meters modified to function with modulation were substituted. The limited amount of work shop space again was a detriment. However, due to the fact that adequate stock levels were kept on hand with regard to spares and expendables, no shortages were experienced.

3.7.2.23 The AN/CPN-6 was used as a navigational aid for the drone aircraft. Four were installed on the shot islands and one was used on Eniwetok. The Eniwetok beacon was a back-up in case of failure of the beacon on the shot islands. Excellent results were obtained

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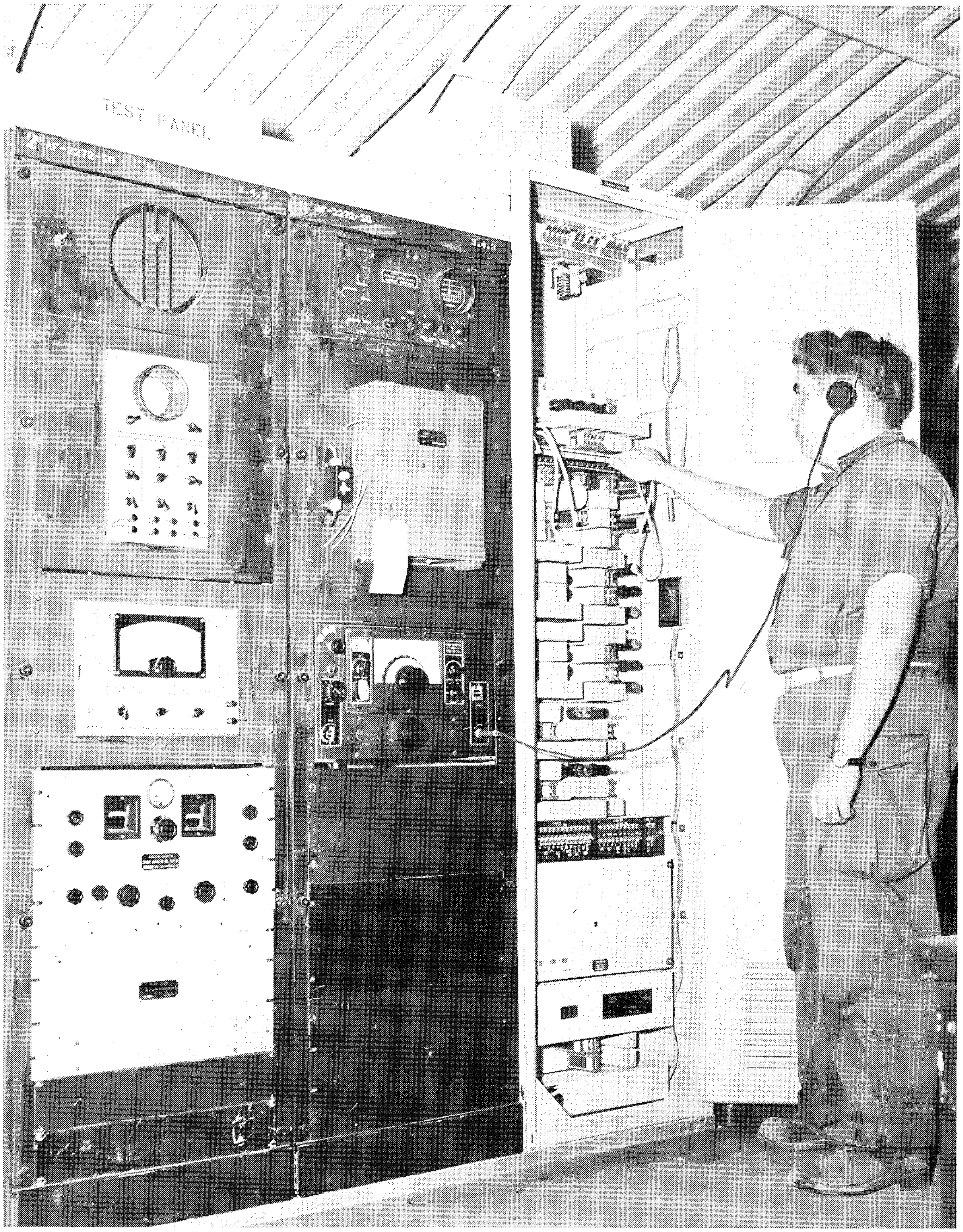

FIGURE 91. Test Equipment ATG 3.4 Communications Maintenance Shop, Eniwetok Island.

[redacted]

from these units. There were no failures and signals were received from this equipment 150 miles from point of installation.

3.7.2.24 AACS communications at Kwajalein were augmented to include sufficient personnel and equipment for continuous operation as required for Operation GREENHOUSE. Hq, JTF–3 arranged for the construction of a new AACS transmitter building and antenna farm on Kwajalein and the Navy telephone exchange was augmented by the installation of two positions of BD–110 and installation of additional trunking circuits to Air Force units required in support of Operation GREENHOUSE. The 1808th AACS Wing installation team phased the Kwajalein construction job. This proved very effective in the utilization of manpower and transportation. Equipment functioning and maintenance were normal for the Kwajalein station and any circuit outages or equipment failures could not be attributed to the additional load imposed by Operation GREENHOUSE.

3.7.2.25 The installation of Radio Set SCR–339 presented no problem since the hutment, HO–17, provided the necessary shelter. The AN/FMQ–1, Radiosonde Receptor and ancillary equipment were housed on some islands in standard 16 x 16 foot Army tents and on the balance in 20 x 48 feet prefabricated buildings. Water transportation to the weather islands was made by LST which departed Pearl Harbor on 20 January 1951 and completed distribution of this equipment on 18 February 1951. This was ample time for the operational phase.

3.7.2.26 The weather operations and maintenance personnel of these islands were responsible for installation, operation and maintenance of the portable equipment furnished. Weather Reconnaissance involved the installation, operation and maintenance of aircraft communications equipment used in WB–29, SB–17, SA–16, B–50 and C–47 type aircraft.

3.7.2.27 The majority of the maintenance performed consisted of replacement of tubes, resistors, condensors, radio frequency checks and repair of dynamotors units used. Many of the repairs required disassembly of the components. These, when reassembled, were realigned and returned to service.

3.7.2.28 There were no mission aborts caused by failures of communications equipment in the aircraft. The fact that each WB–29 aircraft carries two complete liaison radio positions contributed to this success. In flight failures of transmitters and receivers did occur.

3.7.2.29 The radar set AN/APQ–13 is an airborne radar system designed for high altitude bombing and navigation. By utilizing a low PRF (Pulse Recurrence Frequency) it can be used for detection and ranging of all types of weather phenomena. The use of Radar Set AN/APQ–13 in weather reconnaissance aircraft has proved very satisfactory with a minimum of maintenance required. During the duration of this project, the AN/APQ–13 radar sets were operated for more than 1,200 hours with an average maximum range of 64.2 nautical miles. During this period there were only three major malfunctions causing complete loss or use of the equipment. Two of these failures were directly attributed to the failure of vacuum tubes and the other failures was caused by arcing of a high voltage cable.

3.7.2.30 The Absolute Altimeter SCR–718 is the complete equipment necessary for determining the height above the terrain. It's major use in weather reconnaissance aircraft is to aid in seeking the proper millibar pressure level and the determination of winds aloft. These radar sets proved very efficient and were operated for 1,165 hours during the project of 1,172 hours during this project.

3.7.2.31 Radar Set SCR–695, IFF, is installed in all weather reconnaissance aircraft and provides identification for friendly aircraft and vehicles and also can transmit an emergency signal to be used during any inflight emergency. This set has proven very reliable and requires very little maintenance.

3.7.2.32 The use of the Loran Sets AN/APN–9 proved invaluable to navigators of the weather reconnaissance aircraft in overwater flights. It is designed to receive, amplify, and detect ground Loran signals. No major difficulties were encountered in the use of the AN/APN–9 and these sets were operated for a total of 1,171 hours during this project.

3.7.2.33 Motor generator PU–7/UP furnished all of the 115 volt 400 cycle power used

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by the various types of radar equipment installed in weather reconnaissance aircraft. The PU-7/UP proved very satisfactory throughout the entire project.

3.7.3 Air Operations Center Communications.

3.7.3.1 The Air Operations Center included a combination of facilities to provide the commander with a complete air situation and warning service; also, a means of rapid and precise control of participating aircraft. Four radar sets were used in conjunction with the Air Operations Center of Task Group 3.4. These were the AN/FPS-3, search radar, the AN/APS-23, cone filter for the FPS-3; the AN/TPS-10 height finder, and the AN/CPX-1, IFF Interrogator.

3.7.3.2 Space allocations were surveyed upon arrival of personnel and were found to be exceedingly limited. An area of 110′ x 160′ was available in close proximity to the Air Operations Center, but was directly in the center of an extensive AACS antenna farm. This area had to be utilized due to cable lengths. A plan was prepared laying out the entire area with siting of the radar antennas and buildings receiving top consideration. Construction of the FPS-3 antenna tower, power building, GCI operations building, and interior of the AOC was accomplished, somewhat concurrently by individual crews made up of all maintenance and operational personnel assigned. Supervisory held from Task Group 3.2 was utilized during building construction. The FPS-3 tower was constructed on the highest available plot within the assigned area which was approximately 15 feet above sea level. The 25 foot lightweight aluminum tower (AF-178/FPS-3) was ground-mounted on coral sand in accordance with the handbook supplied with the FPS-3, and was completed within five days. A crew of eight radar repairmen accomplished the job of unpacking, inventory, layout, construction, and guying without technical help. An aircraft maintenance stand with a hydraulically operated platform helped construction considerably. Installation of the antenna components proceeded as soon as the tower was completed. The arrival of two technical representatives from the Bendix Corporation helped a great deal as this was the first installation of the FPS-3 in the field. Minor delays in completing this assembly were encountered due to lack of certain items; but as these parts became available, immediate installation was made. The FPS-3 has excellent design characteristics and erection is very easily accomplished.

3.7.3.3 The radar set AN/TPS-10 arrived with one power supply unit badly damaged. This was due to the chassis not being secured to its container by the locking lugs, prior to shipment. The unit was repaired by using available spare parts, and was installed on a tower originally housing an airborne Radar Set AN/APQ-13 which had been used by the Weather Task Unit for weather tracking. The installation of the equipment in this tower was necessary because the surrounding buildings and the AN/FPS-3 tower completely blocked transmission when the set was placed on the ground. The installation was easily accomplished in two days by two skilled radar technicians. However, the tripod legs had to be left off, due to the limited space on the tower. The antenna pedestal was firmly bolted in place, and a small housing on the tower was used for the rest of the components of the set. Power Unit PU-21 was used, and a 55 gallon drum with attached hose provided the fuel for long hours of operation.

3.7.3.4 The Radar Set AN/CPX-1 was installed in approximately one week. Installation was made near the FPS-3 tower, where the best ground-footing was available. Average installation time for this set should not exceed a period of eight hours. At this site, however, unseen difficulties occurred slowing complete installation to one week. Difficulties in fitting antenna tower components were experienced. This necessitated the reboring of beams and braces of the entire tower. The indicator, and other units, were installed in the GCI operations building.

3.7.3.5 The GCI operations structure consisted of two prefabricated barracks. (Engineer Stock Number 58-1390.500.500). These were placed end to end to form a building 20′ by 90′, and compared favorably with the 32′ by 100′ operations buildings used in the permanent air defense radar "21" sites. The

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structure was erected on a concrete floor with a concrete border raised 12′ above the floor itself. This provided additional head room required. The interior was divided into an operations room, a maintenance room, which doubled as a VHF receiver and transmitter room, a tool crib, an alert room and an office.

3.7.3.6 The operations room was made lightproof by light blocks and ventilation was accomplished with louvers. This proved quite effective due to constant surface winds of approximately 20 knots. Platforms were built in order to provide all operators the necessary visibility of the plot boards. Two PPI scopes were placed on the floor, four on the first platform, and three on the second platform. This last platform also included the receiver, indicator, generator, and control group cabinets, as well as the IFF receiver.

3.7.3.7 The maintenance room served several purposes. Primarily, it was the radar and radio maintenance shop, but included the VHF transmitters and receivers, the GTA-3 telephone power supply, main frame and a spare parts section. Space was adequate. Due to the many tools required and on hand, a tool crib was installed as a part of the maintenance shop as stated above. All tools were checked to individuals on a hand receipt basis.

3.7.3.8 The Air Operations Center was installed in a wing of the Task Group 3.4 Headquarters building and was constructed in its entirety by the radar, radio operators, and maintenance personnel assigned to the Deputy Chief of Staff, Communications and Electronics. This room was sound-proofed with fiber glass insulation and finished with acoustic tile.

3.7.3.9 The installation, although not in detailed accordance with Technical Orders, proved satisfactory. The footing for the AN/FPS-3 was placed from 1½ to 2 feet in the ground, dependent upon the rise in the ground elevation. The power cables, connecting the power house and GCI building, were buried approximately 9 inches and marked by appropriate stakes. An earth borer was necessary to dig the holes needed for the guy wires, which were anchored 8 feet in the ground. Due to the fact that very little or no obstructions occurred at this particular site to reduce the efficiency of the set, the present site and general installation proved very satisfactory.

3.7.3.10. The system grounding for this set was accomplished by tying a ground wire, common to the tower, all the components of the GCI building, and power generator, which was fastened to a large metal plate and strung 50 feet out into the ocean.

3.7.3.11 An AN/APS-23 airborne type radar set was used as a minimum range or immediate overhead coverage modification. A Mark III IFF set, was also used for interrogating purposes. Performance logs, used by maintenance personnel for equipment sensitivity and malfunction checks, were kept for all three radar sets. As this set was operated on a 24-hour basis, it was deemed necessary to assign the personnel as crews. The eight men sent at the late date were placed on crews with one or more of the experienced repairmen. At the critical operational times, all the repairmen were utilized.

3.7.3.12 Approximately 72 man hours per day were expended on the operation assigned radar equipment. This time included preventive and specialized maintenance and training. Before all critical operations, the equipment was tuned and aligned for maximum efficiency. Without exception, the response was favorable although no test equipment was available until the last 5 days of the project. It is recommended that one hour a day be allocated for preventive maintenance and sensitivity checks. Originally, nine radar repairmen were assigned to GCI for the purpose of installation and maintenance. Eight more maintenance personnel (SSN 995) on TDY from the Air Defense Command were added later for familiarization with the set. The radar set AN/FPS-3 was unfamiliar to all personnel, so periods of instruction were required regularly by the Bendix Technical Representatives.

3.7.3.13 The 7 KV high voltage cable, 9711, had a tendency to arc from the inner conductor to ground. This was generally thought to be the result of fungus. Shielded coaxial cable, C-G9, was substituted and performed very satisfactorily.

3.7.3.14 The AN/APS-23 antenna portion of the FPS-3 located on the tower main frame

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was found to be extremely corroded after two months of operation. It was repaired and painted with zinc chromate and later replaced with a new antenna. The corrosion factor was due largely to the tower and components being subjected to salt spray, which was one that constantly needed attention. A separate crew was assigned corrosion control as a secondary responsibility.

3.7.3.15 Installation of the AN/TTQ-1 operations room telephone equipment (Figure 92) was made following instructions contained in TM 11-438, TM11-438 Supplement, and material prepared by Watson Laboratories covering modifications made on the equipment to suit the needs and requirements of the Air Operations Center in positioning and controlling the movement of aircraft in the test program under very exacting conditions. The telephone components installed consisted of three units which provided 18 telephone lines, 4 VHF receivers and transit lines, and 3 units which contained 5 telephone lines. All of the units had selection keys for the various lines, ring-down facilities, night alarm facilities, and signal lamp facilities. The equipment proved to be most satisfactory from an operation and maintenance standpoint. Some confusion resulted from too many lines being paralleled and common in the three 18 line units. In some instances, outgoing calls made by one party were mistaken for incoming calls by another party manning an adjacent position. The AN/TTQ-1 system provided sufficient communications facilities to fulfill the requirements demanded of the operation.

3.7.3.16 Cables used with the system were those normally a part of the AN/TTQ-1 set. Fifteen 24 conductor cables were used in the system installed in the AOC. Each cable was 35 feet long and had a Jones plug on each end for making connections to various components. All telephone lines terminating into the AN/TTQ-1 system were brought in on cable pairs from outside points to terminal strips conveniently located for making connections to terminal strips contained within the relay rack. Control wires were strung from the relay rack to radio-transmitter site for the purpose of providing VHF facilities. The distance to the radio-transmitter site was approximately 100 feet. Five BC-639 radio receivers and five BC-640 transmitters were used with the system.

3.7.3.17 The AN/FPS-3 radar set was designed and manufactured by Bendix Radio Division, Bendix Aviation Corporation, primarily as a long range early warning unit with added features of versatility to enhance its principal characteristics. It was with an eye toward these characteristics that this unit was chosen as an integral part of Operation GREENHOUSE and its associated air missions.

3.7.3.18 Also of interest from an operational and a technical standpoint is the fact that this was the first unit of its type to be put to use in the field. The original engineering model had been undergoing test and development for quite some time, but as is often the case, the design engineer with complete laboratories and shops at his fingertips, can not anticipate problems encountered in the field. It is in this respect that the AN/FPS-3 deserves much credit. For reasons beyond control of the operating agency, no test equipment arrived with the unit. However, with a limited amount of locally procured equipment which was never intended for the use to which it was put, the set was installed and maintained with exemplary efficiency.

3.7.3.19 The entire installation was made chiefly by the nine man crew of radar mechanics assigned to the project. Two Bendix field engineers were on hand to offer technical assistance but did not arrive until the tower erection was all but completed. Previous construction experience of the men doing the work was evident in the fact that the tower went up without any delay due to technical misunderstanding or personnel mishap. From a safety viewpoint, experience is an important consideration for this type of work. Further evidence of adequate training and experience gleaned through a previous factory visit was shown by the ease in which transition was made although this was their first actual meeting with the AN/FPS-3 radar set.

3.7.3.20 Throughout the entire installation phase there was no attempt made to keep any sort of a man-hour record. This was mainly due to the fact that the entire unit did not arrive at one time but kept

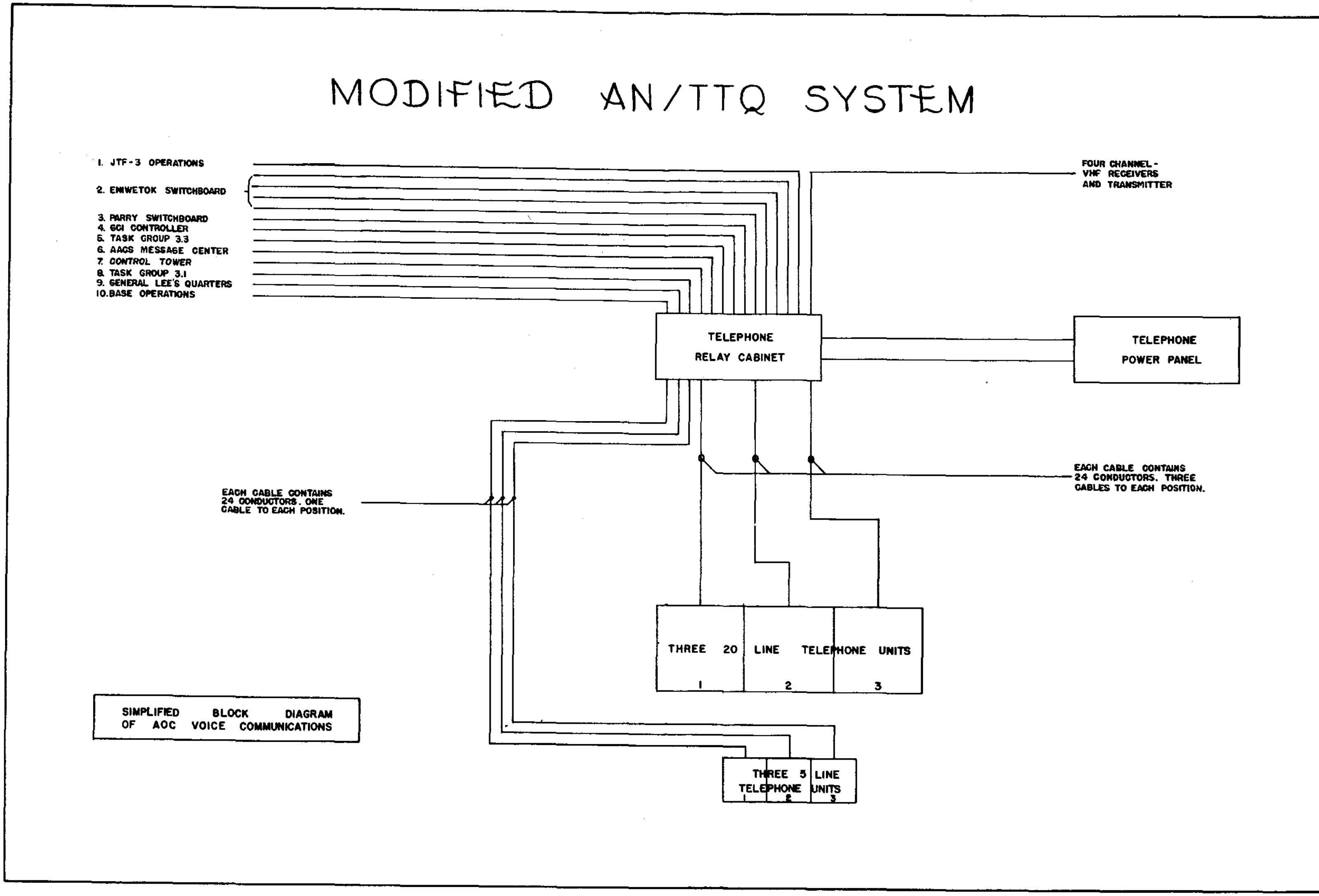

FIGURE 92. ATG 3.4 Operations Center Voice Communications Facilities, Eniwetok Island.

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coming in by small groups covering a period of over one month. As the various components arrived, they were immediately installed in their respective places, then until the next group arrived, time would be diverted to the other phases of the overall operation. Unfortunately, the two most vital groups of components did not arrive until the very last. These were the component interconnecting power and control cables, and the operating control components themselves, so there was no chance to pre-test or check any part of the unit before actual project operation began. Initial installation was started on the 12th of February and the unit and entire center was declared in official operation on 19 March 1951.

3.7.3.21 All AN/FPS-3 installations are manufactured with the intent of being standardized according to specified building size and floor plan with all operating components placed in definite locations. Consequently all interconnecting cables are pre-cut as to length and banded with all identification necessary. However, since the GCI operating room was approximately one-half the standard area, the problem came up of what to do with all the excess cable. This was solved, whenever possible, by switching cables identical except as to length. As any switch was made, the standard cable list was so marked eliminating confusion if later any one or more cables had to be located for maintenance reasons. Also, since there were no cable ducts in the floor, much of the cable was kept from underfoot by running them outside and re-entering again at wall points nearest the components affected. Equipment mounted on the control disc was also rearranged in a departure from standard but in this case, cable lengths remained approximately the same and no switching was necessary.

3.7.3.22 Since the air missions of Operation GREENHOUSE were concentrated within close radar range of the unit, it was deemed necessary to supplement its normal sky coverage with direct overhead coverage. A specially modified AN/APS-23 aircraft radar set was mounted on the rotating antenna assembly, its antenna tilted so as to cover the blank overhead cone. The video information was then passed to the PPI scopes and mixed with the video of the FPS-3.

3.7.3.23 Shortly after the AN/FPS-3 was put into operation it was found to be causing interference in the APW-11 beacon receivers of the drone aircraft. This in turn would give the MSQ-1 facilities an indication of faulty drone equipment. The problem was finally taken care of by a "Rube Goldberg" arrangement using an APW-11 beacon to receive the MSQ-1 trigger pulse, delay it approximately 100 microseconds, and then use it to trigger the FPS-3. Since the repetition rate of the MSQ-1 was only 10 cycles higher than that of the FPS-3, operation was not affected except to the extent that the MTI feature could not be used. This, however, was not serious; once the drones were in the air no interference was present and after a period of approximately five minutes, normal operation could be resumed.

3.7.3.24 As previously mentioned, the assigned technicians had a good background in radar maintenance which enabled them to quickly absorb the necessary familiarity required for efficient maintenance of the unit. The two Bendix representatives also were constantly on hand to render assistance and give instruction. Regular instruction periods were held covering all phases of maintenance on all operating components and ancillary equipment. However, since all the men had been through some radio or radar school in the past, little time was devoted to basic fundamentals or circuit theory, but instead emphasis was placed on circuit analysis and troubleshooting. Instruction in these two phases was deemed most valuable considering the amount of time available.

3.7.3.25 Throughout the entire project the unit was on an operational status for a total of 955 hours. During this period the actual amount of operational outage due to equipment failure did not total over 2 hours. These outages were due to tube failures, principally the 2C40 type oscillator tube which has a normally short life and shows no symptoms by which failure can be anticipated. Since personnel shifts rotated every six hours, a shutdown period of one hour per shift was allowed for instructional purposes. During these shutdown periods routine preventive maintenance was also performed.

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3.7.3.26 Component failures which did not cause an actual operational outage were also normal with one exception in the PPI scopes. This failure appeared in every scope unit and was caused by the 36 to 1 speed control transformer idler gear binding on its shaft. This binding was apparently the result of incorrect gear or shaft tolerance. This, however, is not considered a design defect, but instead a production line inspection error because the identical 1 to 1 speed idler gear gave no trouble.

3.7.3.27 The greatest cause of expended maintenance time was not due to equipment failure, but to corrosion. The high salt water content of the air immediately took effect on any unprotected surface and was insidious in tenacity. Aluminum was the most susceptible although the action was rapidly evident on other metals, particularly the tower and antenna erection hardware. Affected areas were cleaned and coatings of paint or zinc chromate applied, the latter being the most effective.

3.7.3.28 Little can be said in this report about the spare parts supplied, except that they were more than adequate. In fact, most of the spare parts were not uncrated save for the faster moving items such as tubes, fuses, pilot lamps, etc. Throughout the entire project the unit was maintained without any of the specific test equipment necessary for assurance of optimum performance. The antenna mounted "A" scope was the only oscilloscope available and this served double duty, both on the tower and as the precision "A" scope in the operations room. A TS/239 oscilloscope and the precision "A" scope unit did finally arrive about two weeks before the project was over. For the measurement of system performance and noise figure, an "L" band signal generator is necessary, but none was available. In an emergency attempt, a locally procured "S" band generator was tried and found to give a harmonic strong enough to be used. This indication was far from accurate since it could not be calibrated against any standard but still would show relative performance changes. Through the use of this method it was possible to keep the set peaked to a reasonably high performance level. Since the entire unit was new and all components had been calibrated and aligned at the factory, the lack of test equipment was not too serious a problem as far as the operations room components were concerned. Without the specially designed MTI signal generator, however, the efficiency figure of the MTI system could not be determined. The system, however, incorporates a built-in test circuit through the use of which the system performed satisfactorily.

3.7.3.29 In an effort to remove some of the intermediate steps normal to standard methods of plotting and tracking aircraft from radar, an advanced model of a semi-automatic plotting device was installed in the AOC. The desirability of using a method such as this for plotting lies in the reduction of error and time delay in the reporting system. Further advantage of the semi-automatic system arises from conservation of personnel. The device is referred to in the document as the TPI (Target Position Indicator).

3.7.3.30 The function of the TPI is to present on a large (10 feet in diameter) screen, plotted radar data in addition to geographical overlay descriptive information. The screen is so located in the AOC that it may be viewed in sufficient detail by an audience of 60 or more observers. The procedure of presentation takes place in two photographic steps, each of which is performed by partially modified camera-projector units AN/UFA-2 PA-616 (XQ-4). For the sake of brevity and to differentiate between their primary functions, these two units will be referred henceforth as Units "A" and "B."

3.7.3.30.1 The operation of Unit "A" involves photography of each complete sweep of the PPI of the AN/FPS-3 search radar. The PPI used is a blue-emitting, short-persistence, phosphorus, 12 inch tube exposure of all the radar echoes built up as an image retentive through 360° of the sweep. Upon completion of the sweep, the film is advanced to a processing station where it is rapidly (in a period of less than 4 seconds) developed, fixed, washed and dried. While the processing step is underway, a second PPI picture is being formed. At each completion of the PPI sweep, newly processed pictures are being advanced to a projection position where, by suitable optical

arrangements, it is projected upward to a horizontally oriented plotting board in an enlarged (30 inch diameter) image of the PPI.

3.7.3.30.2 Unit "B" is so located that by suitable optical arrangements, it is able to photograph the plot marks applied manually to the plotting board during operation as well as pre-dawn flight and geographical patterns. The aforesaid markings are made luminous by the well known method of plastic edge illumination and chinagraph pencils. The PPI pattern, however, that is projected by Unit "A" is not "visible" to the blue sensitive film of Unit "B," because the "A" unit projection light is filtered to project with minus blue light only. Upon completion of the exposure by Unit "B," the film is advanced to a processing station and thence to a projection station in a manner similar to the performance of the same function by Unit "A." In the case of Unit "B," however, film movement takes place in a pre-timed cycle of 15 per minute. It is not "slaved" to the radar antenna.

3.7.3.31 Figure 93 is a reproduction of a few frames, each of the products of Units "A" and "B." At the top is shown a reproduction of the PPI photograph. Range marks shown are at 10 mile intervals and azimuth lines at 30 degree intervals. The scope has been off-centered so as to place the target area in the center of the image. The position of Eniwetok obviously is located at the coordinate center. In the lower portion is a reproduction of a few frames of the product of Unit "B." Here are shown the vector plotting arrows superimposed on flight patterns applicable to the situation.

3.7.3.32 An initial difficulty in installation followed from the fact that the equipment was planned to operate from the floor level. A second difficulty was that the projector distance of "B" unit had been set up as 33 feet at the factory. These dimensional discrepancies proved to be remediable by the factory technical representative although the remedies adopted resulted in conditions short of optimum. It should be noted that the difficulties of maintenance are increased as a result of cramped space surrounding those parts of the equipment requiring servicing and adjustment. It is estimated that were it not for simultaneous installation of extraneous equipment such as air conditioners, wiring, ducts, etc., the unpacking and installation of the TPI as used in Operation GREENHOUSE could have been accomplished by a carpenter, carpenter's helper, electrician, and Technical Representative in about one week. Factory prefabrication to fit existing conditions would greatly facilitate such an installation.

3.7.3.33 Preliminary plans called for providing for VHF channels to be placed at the disposal of controllers operating in the Air Operations Center, and the Ground Control Intercept Station. The equipment to be used consisted of five BC–640 transmitters and five BC–639 receivers. It was decided prior to installation, that it would be necessary to improvise in many instances because of the lack of all necessary items of equipment. Equipment shipped consisted of 5 BC–639 receivers, 5 BC–640 transmitters, and 1 BC–638 frequency monitor. All basic units were without connecting cords, Jones plugs, special power plugs and cables, special items such as headsets, microphones and plugs, PL–68 and PL–55, also spare tubes, resistors and condensors so necessary in an overseas installation. Inter-connecting cords were improvised, but without the special plugs they constantly handicapped maintenance work. Headsets and microphones were acquired from radar units when available and replacement parts were borrowed from other Task Units.

3.7.3.34 All BC–640's were placed side by side because of limited floor space. Necessary ventilation was accomplished by removing the rear doors and clamping the interlocks together. A warning door was placed to keep uninformed personnel on the site from encountering this danger and all radio personnel were repeatedly told to exercise extreme caution.

3.7.3.35 The antenna problem was an obstacle because again, space was at a premium. The AB/171 antenna equipment shipped was not used as their overall ground area exceeded that available. Two 75 foot telephone poles with two cross arms each, were erected with the aid of Task Group 3.2. The poles were cemented to a depth of 10 feet and guy cables, part of the AB/171 were used to brace poles and keep them from swaying. The

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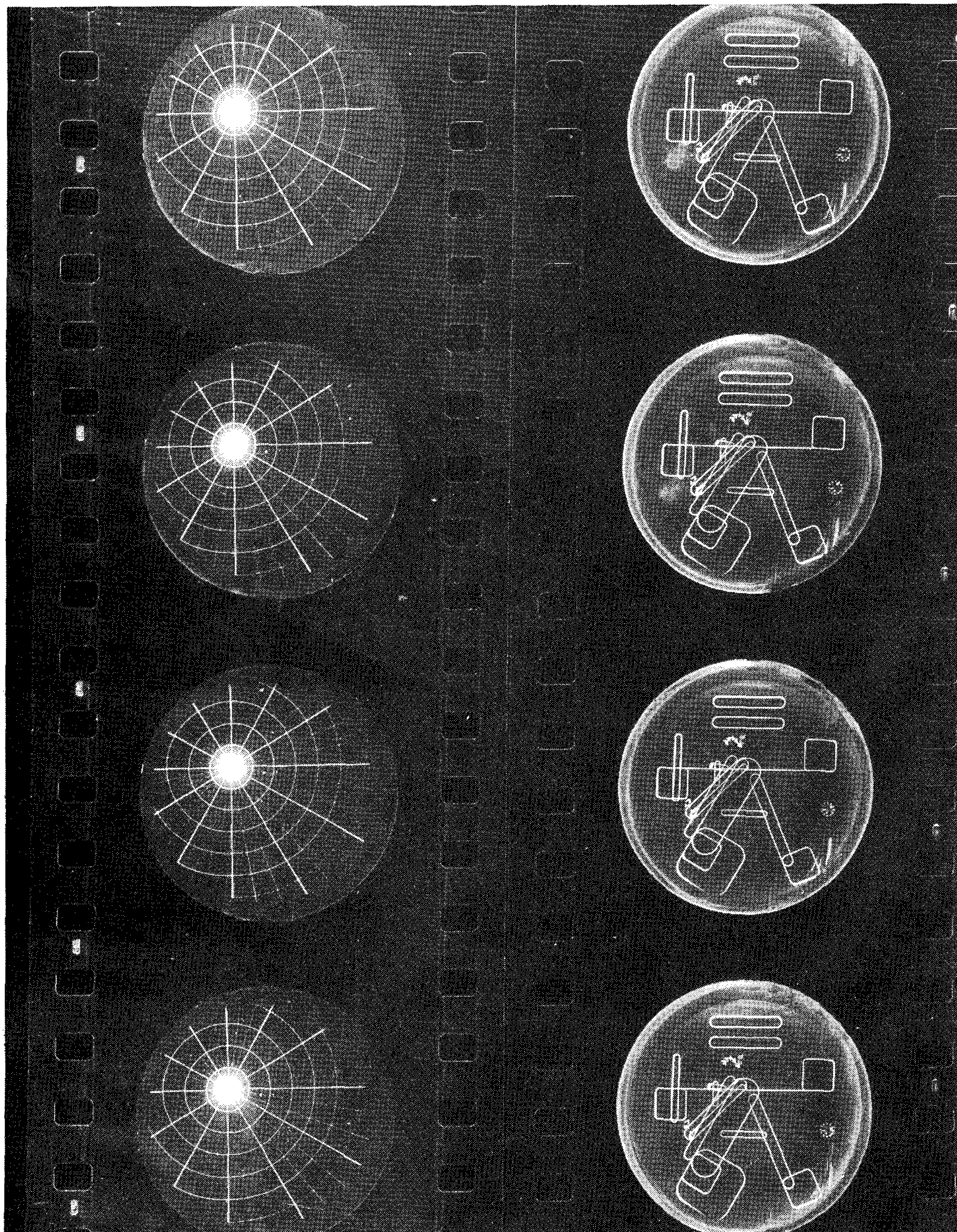

FIGURE 93. Reproductions of PPI Scopes Installed in Operations Center, Eniwetok Island.

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transmitting RC–81's were then 25 feet from those of the receivers. This proximity caused over-loading and inter-channel reaction.

Eight RC–81's were received, an amount sufficient for four channels. Two VHF antennas were improvised. One, a coaxial for receiving, and the other a dipole consisting of two elements, part of an RC–81, projected through a 2 x 4 timber which was then impregnated with Gylptol. Only 4 CO–1082 Co-ax's were received. Eight hundred RG–11–U's were drawn from another organization and brackets were fashioned for the RC–81's and connections to the BC–639's were improvised.

3.7.3.36 A number of radar cords CX–1245 were disassembled to meet the requirements of remote lines for the BC–639's and a modified modulation line for transmitting the time hack broadcast. Remoting of the BC–640's was accomplished in the normal manner.

3.7.3.37 The additional commitment of broadcasting time hacks created a problem that was met in the following manner. All BC–640's were to be modulated simultaneously. To use the normal remote system was out of the question, as it would parallel the entire system for the normal operation. The time signals were to be received over two systems, a landline and a back up HF channel. Both of these circuits were brought into a double pole, double throw switch. The common terminals were connected into a line of parallel drops, each of which terminated in a PL–68 which was inserted into the local microphone jacks of the BC–640's. The line from the output of the BC–779 which was used for the HF pickup of the time signals, was coupled to the DPDT switch mentioned above through an HS–30 which matched transformer C–410. The use of this transformer enabled the receiver to hook into a characteristic load and the impedance was successfully matched. In series with the secondary circuit of this transformer, an SPST toggle switch was installed which enabled the attending operator to key all transformers at one time, a feature that proved useful in striving to keep the carriers off the air for as short a time in advance of the broadcasts as possible. The landline terminated into an intercom master station which provided constant touch with the time hack announcer throughout the hour long periods. Across the voice coil of the speaker, a line was connected and then into a telephone repeater coil acquired from the Base Exchange. This coil matched the output impedance of the intercomm to the BC–640's from the landline. The gain was controlled by the volume control already built into the intercomm. When using the BC–779, the modulation gain was of course controlled by the receiver gain. Each of the transmitters was manually placed in the local mike position 30 seconds before broadcasts and returned to remote position in each instance where more than a minute did elapse between parts of the broadcast to permit any remote operator the use of the channels.

3.7.3.38 A loudspeaker was installed in the Air Operations Center. A switch and volume control was made readily available to the AOC Controller position. A channel change selector switch constructed of a dual wafer type switch was installed in the AOC, and made available to the Chief Plotter who is in constant communication with the AOC Controller over a head and chest set landline.

3.7.3.39 The one remaining fault of the VHF system is to prevent a parallel keying of two or more channels or one channel and a landline in the GTA and AN/TTQ–1 systems. The remote system is paralleled to 10 positions and at times, needless blocking of VHF channels for other organizations takes place because of two or more transmitters being keyed and modulated for a single channel transmission. At other times a transmission intended for a landline goes out on a VHF channel.

3.7.3.40 Remote lines are adequate. Cross talk was reported but as outlined earlier, this is a fault of insufficient separation between transmitting antennas and receiving antennas. In future missions of this type, a complete pre-installation survey should be made after determination of requirements to prevent difficulties arising from close proximities of all antennas. No breakdowns of VHF channel communication occurred during the mission.

3.7.3.41 The AN/GTA–3 telephone central equipment furnished as part of the AN/FPS–3

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radar set was received at the forward site complete and undamaged. Instructional material was included with the shipment. This material was informative, comprehensive, clearly written, and complete in every respect. The instruction manuals were closely followed in the installation of the complete communications system for the GCI station, built around the AN/FPS-3 radar set. All positions are connected with the main frame TA-172/GT so that cross-connections can be made on the terminal boards for any special circuits required for making up the GTA-3 system. Cables were pre-cut to a standard length which varied for given cables. Telephone units, switchboards, and other components were made in such a manner as to make it easy to install or to mount on the units for which they were built. Installation could be made quickly and without difficulty by first positioning the indicator groups or positioning the facility to be serviced. The multi-pair cables were then installed from the units to the main frame or the other termination in the usual manner. All positions are connected with the main frame TA-172/GT so that cross connections can be made on the terminal boards for any special circuit required. It is estimated that the entire system be installed in approximately 30 man hours, provided the installation does not deviate from the standard engineered system.

3.7.3.42 The system as required in the GCI station, which was an integral part of the Air Operations Center, necessitated making some changes in the standard system pictured in the blueprints and manuals accompanying the equipment. These changes presented no particular problems and in most cases involved only substitution of 10-pair cable for 20-pair cable and vice versa. Some cross-connections in the main frame were rearranged. One TA-170/GT W. W. Plotter's Unit and one TA-179/GT Plotter's Unit were installed behind the plot boards located in the Air Operations Center, a distance of about 100 feet from the GCI Building. Jumper connections for paralleling these units were made in junction box, J-366/GT, to the TPI Room, and PL-68 plugs and jacks were used to terminate lines in the TPI room.

3.7.3.43 It also was a requirement for telephones to be installed in the Target-Position Indicator Room and that these lines be parallel with the four plotter-teller lines in the GCI Building and the four plotter-teller lines terminating within the AOC. This made a total of twelve parallel lines in the locations with three positions on each line. Pre-cut cables of sufficient length to reach from the main frame to the TPI Room were not available. Ten-pair cable, not a part of the set, was strung from junction box J-366/GT to the TPI Room and proved very satisfactory.

3.7.3.44 The AN/GTA-3 central office telephone equipment proved to be a flexible, well-designed system with many advantages over the AN/TTQ-1 type central office equipment. It is superior in operation as well as appearance. Units are constructed in such a manner as to give a very pleasing appearance; cables and connectors are well designed and fit in with the AN/FPS-3 system in a superior manner.

3.7.3.45 The AN/FPS-3 radar operates best using a power supply of 208 volts, alternating current. Power of this value is much too high to use with the telephone power unit PP-599/GT, part of the AN/GTA-3 system, although one phase of 120 volts is used. Ringing current of over 100 volts results when 120 volts AC are used. Ringing current of over 100 volts when 120 volts AC are used across the primary of the transformer in PP-559 Power Unit. It was therefore necessary to use a power source of no more than 110 volts AC to prevent excessive fuse blowing within the system.

3.7.4 Electronic Control of Drone Aircraft.

3.7.4.1 The primary method of controlling drone aircraft flight was by transmission and receipt of radio control signals, i.e., by the utilization of the AN/ARW-41—AN/ARW-40 equipment between QB-17 and controlling station. The QT-33 primary control medium was the AN/ARW-63—AN/DRW-5 systems, a slightly higher frequency equipment than the QB-17 type.

3.7.4.2 To provide an auxiliary radio control system in the event of failure of certain components of the primary system, an arrangement of circuits and additional compo-

nents were installed. Appropriately named the Emergency Radio Control System, it provided sufficient control of the drone flight and equipment to permit take-offs, landings, and the basic AEC or USAF operational requirements.

3.7.4.3 Normal methods of aircraft navigation using the AN/APS–10 Radar and standard navigation aids employed by the director crew were considered sufficiently accurate for performance of the AEC requirements.

3.7.4.4. To permit exact placement of the USAF drones in time and position with relation to the atomic shock wave, the AN/MSQ–1—AN/APW–11 Radar control system was employed. The AN/MSQ–1, an automatic tracking and plotting radar, readily discerned and visually plotted the flight track of the drone. Plotting board observers could steer and alter the speed of the drone as required by transmission of radar control signals through the radar equipment. The AN/APW–11 installed in the drone performed the functions of receiving the control signals, passing them on to the remote flight control equipment for desired drone maneuver control, and transmitting a beacon "Echo" for ease in reception by the ground radar receiving circuits and for identification purposes. Limited control of the drone flight functions could be exercised by the radar control system as it was intended merely for the specific task of exact drone placement.

3.7.4.5 The remote control systems and operational techniques were basically limited as follows:

3.7.4.5.1 One drone only could be remotely taken-off or landed at one time by the ground control stations.

3.7.4.5.2 Each drone required its own director aircraft and required "backing-up" by a spare or multi-installation director.

3.7.4.5.3 Each drone required different frequencies for radio control, radar control, and television, the latter being installed in QN–17's only.

3.7.4.5.4 Radio control frequency band spread was excessively limited for the operation of twelve drones simultaneously and did not allow sufficient separation for changes of frequencies to positively eliminate inter-action or interference from other sources.

3.7.4.5.5 Primary method of denoting drone flight behavior was by visual reference.

3.7.4.5.6 Each AN/MSQ–1 Ground Radar could control and track only one drone.

3.7.4.5.7 Control signals were very susceptible to jamming by intentional or spurious transmissions. This was particularly true of the radio control systems due to their low power transmissions, poor image rejection, and poor frequency discrimination of the receiving system.

3.7.4.6 As soon as practicable during the training program, certain drones (ten QB–17 and two QT–33) were selected as primary Drones because of their overall suitability. The remaining Drones were relegated to spare category.

3.7.4.7 To eliminate the need for frequent changing of equipment between aircraft, drones and primary directors were "matched" for operating control frequency and flown as a pair as much as possible. When operational requirements dictated "juggling" of aircraft, frequency changes were made in the director aircraft to match the drone. In the same manner, USAF Project aircraft were matched to operate against a particular Ground Radar (AN/MSQ–1) each with a specifically assigned radar control channel.

3.7.4.8 Radio control frequencies were spaced at least one megacycle from each other to prevent inter-Drone frequency and control interference. Radar control frequencies were spaced at least fifty megacycles from each other. In spite of these precautions, it was found that certain radio control frequencies interfered with one another necessitating wide flight altitude separation to lessen the interference signal strength. The ground radar interaction was eliminated by their physical separations of one-half mile in distance.

3.7.4.9 Interference on the radio and radar control channels was a continuous problem. Although the source of radar control interference was located and was closed down or corrected during drone operations, location of the sources of spurious radio control interference was never quite solved. Monitor stations, both air and ground, were set up to attempt location of the sources, and much electromagnetic radiation equipment was turned off during Drone operations.

3.7.4.10 To assist director crews in proper control of their drones, a signal monitor station was set up in the remote control building. This station provided the director crews with information relative to signal strengths of their transmissions and proper functioning of their flight function selectors. Equipped with function signal lights, television receivers, signal strength meters, radio control receivers on all channels employed for drone control and communications facilities, this station was able to detect director aircraft radio control equipment malfunctions and so advise the flight crews. Although it could not detect actual malfunctions of the drone equipment other than by flight information received on the television screen (QB–17 drones only) and/or by advice from the director crew of the drone behavior by visual observations, technicians standing by at this station were in a position to offer technical advice and recommend emergency measures to overcome the difficulties. This station was also employed for coordination purposes and to monitor the radio control channels for interference detection.

3.7.4.11 The receiving system of the Remote Control Equipment is highly susceptible to interference by spurious signals, engine ignition noises, and image frequency transmissions. In addition, the transmitting and receiving equipment operates in a frequency band (30 to 46 mc) which is also employed for communications and other uses. Further, the low power output of the transmitter can easily be "blocked" at the receiver by more powerful transmitters operating on lower harmonics or near the actual frequency employed on the control equipment. The loss of one QT–33 drone on take-off was possibly caused by interference signals blocking the drone receiver, and not allowing proper signal reception for take-off control.

3.7.4.12 The mobile ground control equipment proved sufficiently rugged to withstand hard field usage and performed its task in an excellent manner. Figure 94 shows the AN/MRW–3 mobile unit. Figure 95 is a functional chart of the remote control unit.

FIGURE 94. Mobile Ground Control Unit AN/MRW-3

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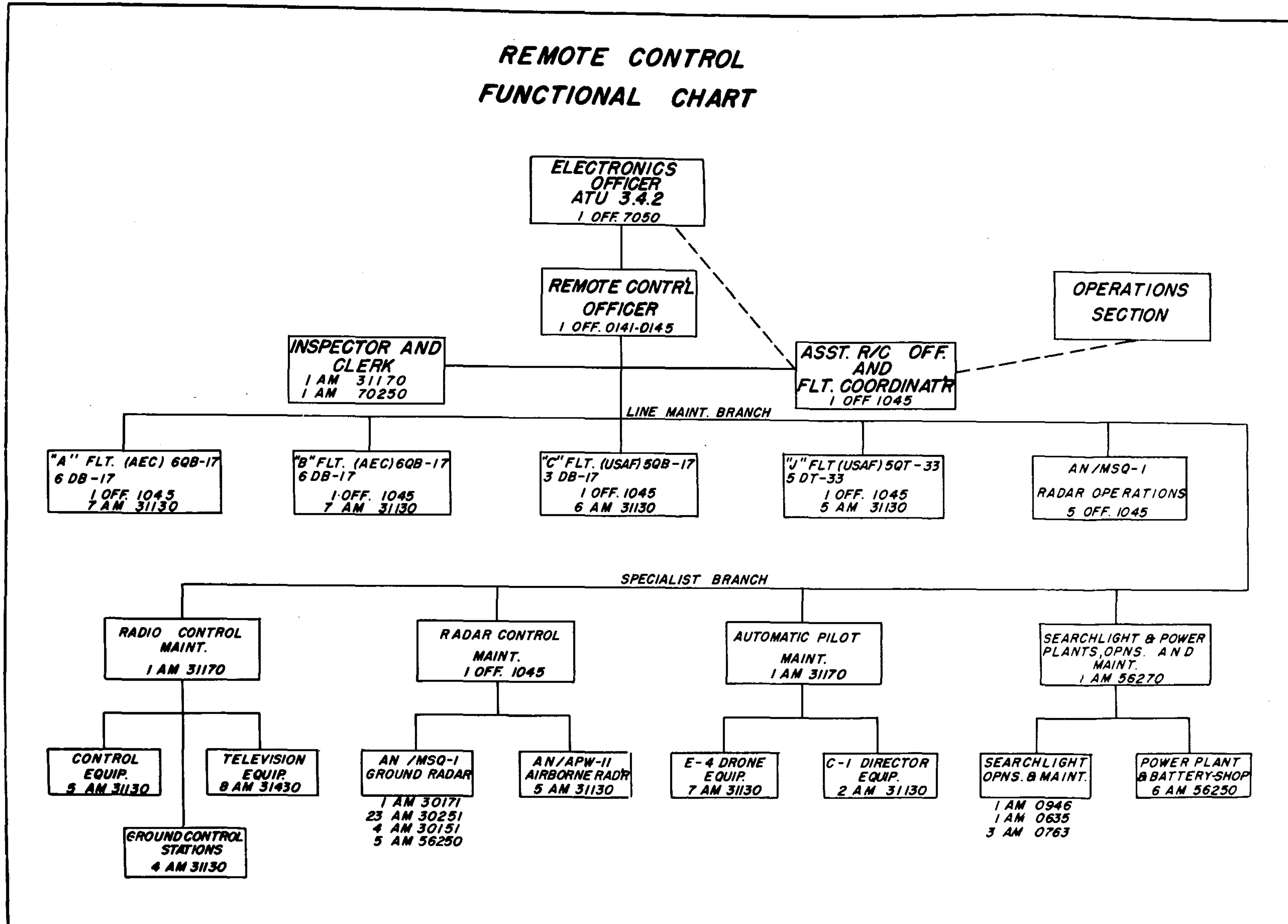

FIGURE 95

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Chapter IV

FREQUENCY AND CALL SIGN ASSIGNMENT AND CONTROL

4.1 Frequency Assignment

4.1.1 Frequency requirements for Operation GREENHOUSE were a responsibility of the J–5 Division of Hq, JTF–3. Most elements of JTF–3 had made their frequency requirements known by 15 June 1950. These were consolidated and presented to the Joint Electronics Board for authorization. All requirements were approved by the Joint Electronics Board by 25 June 1950, except those requiring international clearance. This early frequency assignment permitted the Task Groups to complete their antenna engineering and construction with ample time to obtain the supply of crystals through normal supply procedures.

4.1.2 The outbreak of combat in Korea late in June 1950 created a priority requirement for more frequencies than were immediately available to the Joint Chiefs of Staff which resulted in the withdrawal of a number of those assigned to JTF–3. The Joint Electronics Board for frequencies assured JTF–3 that the same, or frequencies within a few kilocycles, would be returned to JTF–3 in sufficient time for Operation GREENHOUSE. Engineering and construction of antenna farms continued on this basis; however, supply action on crystals was cancelled by the Task Groups for those frequencies withdrawn by the JCS.

4.1.3 By 1 September 1950, it became apparent that the frequency plan would have to be augmented to include numerous frequencies occasioned by additional AEC requirements. In view of this fact, it was deemed advisable to have each of the Task Groups revise their frequency plans to include all requirements with a deadline date to arrive at Hq, JTF–3 not later than 15 November 1950. These plans were consolidated and submitted to the Joint Electronics Committee who did an excellent job of juggling, coordinating and clearing, to assign to JTF–3 for Operation GREENHOUSE frequencies which would require a minimum of alteration of constructed antennas. It is estimated that 95% of the new frequencies assigned were on the same or within 5 kc of the initial assignments.

4.1.4 With the exception of the Air Patrol Net and the MARGIL Base Net radio frequency assignments for the Naval Task Group were taken from JANAP 195. Because of its use in the Far East by a Navy Patrol Wing, the Air Patrol Net was cleared with the USFAPJCEC for Task Group 3.3.'s use by the Headquarters, JTF–3. The latter headquarters also requested and obtained permission from the FAPJCEC for Commander Task Group 3.3 to enter the MARGIL Base Net in order to permit that commander to communicate with the naval Patrol Squadron Commander (CTU 3.3.5) at Kwajalein.

4.1.5 Supply action went into high gear on 15 December 1950 and completed most of the crystal requirements early in January. The remaining crystal requirements were met by adjustment of old crystals or grinding of new crystals by the JTF–3 crystal grinding unit which was operated by TG 3.2 at Eniwetok.

4.1.6 To provide for operation free of interference in an already crowded spectrum, procurement of frequencies of the magnitude required for Operation GREENHOUSE normally requires a processing period of several months. The overall communications plans of each subordinate unit, including channel requirements and types of equipment, must be resolved. These plans must be coordinated at Joint Task Force level to eliminate mutual interference and then submitted to the JCEC for further coordination and assignment which requires approximately thirty days.

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Publication and distribution of the overall frequency plan by the Task Force requires an additional 30 days.

4.1.7 The Scientific Task Group (TG 3.1) was composed of numerous program directors and widely dispersed civilian contracting agencies, the frequency requirements for which could not be anticipated and required time to obtain. Had it been as easy to coordinate and obtain the frequency requirements of the Scientific Group as it was in the military groups, the time consumed for completing the frequency plan could have been reduced considerably.

4.1.8 The frequency plan for Operation GREENHOUSE (Appendix 7 to Annex "F", Field Order No. 2, Hq, JTF–3, entered as Appendix 1 to this report) shows the circuit number, using organization, frequency grouping by circuit, and the purpose for which used. A chronological listing of these frequencies showing circuit assignment and use follows:

FREQ. (kc)		CKT.
272	Airport Traffic Control Tower Transmit Eniwetok TU 3.4.3	73A, 74A
278	Airport Traffic Control Tower Transmit Kwaj. TU 3.4.3	73B
326	Approach Control Kwaj. Transmit TU 3.4.3	74B
345	LF Homing Beacon Eniwetok TU 3.4.3	75A
359	LF Homing Beacon Kwaj. TU 3.4.3	75B
500	Air Distress, Eniwetok & Kwajalein	72A, 72B
532	Surface Patrol Secondary TU 3.3.2	52
1360	AFRS Eniwetok, Armed Forces Broadcasting Station TG 3.2	47
2122	Drill Circuit TG 3.3 Training	55
2315	Broadcast Time and Warning Signals TG 3.1	4
2534	Surface Patrol Primary TU 3.3.2	52
2586	Broadcast Time and Warning Signals TG 3.1	4
2656	Sonobuoy Control Circuit TG 3.3	51
2716	Ship-Shore Voice TG 3.2	22
2844	Ship-Shore CW TG 3.2	31
3000	General Warning, Surface, Voice TG 3.3	59
3045	Kwaj-Majuro-Eniwetok-Wake-CTG 3.2 Admin Net	34
3242.5	Eniwetok-Kwajalein RATT TU 3.4.3	61
3310	SAR TG 3.3	100
3340	Eniwetok-Kwajalein RATT TU 3.4.3	61
3345	ASW, Air & Surface; Time & Warning TG 3.3	54, 60
3375	TG 3.4	99
3415	Air Patrol TU 3.3.3	53
3450	Kwaj. Air Route Control, connects Guam-Kwaj-Johnston, 3.4.3	70, 81, 82
4030	Guam Weather Intercept TU 3.4.3	62
4240	Lighterage Net (Voice) TG 3.2	33
4330	Weather Recon Net: Eniwetok-Kwaj-Recon a/c TU 3.4.3	71
4475	SAR TG 3.3	100
4495	Airport Traffic Control Eniwetok & Kwaj TU 3.4.3	73A, 73B, 74B
4500	Hq TU 3.1.1 to Shot Island Truck, Eniwetok	2
4692.5	CTG 3.3-Guam Administrative RATT	50
4765	Airport Traffic Control Eniwetok & Kwaj. TU 3.4.3	73A, 73B, 74B
4928	TG 3.4	99
5062.5	Drone Unit TG 3.4	98
5260	CTG 3.3-Guam Administrative RATT	50
5505	Air Patrol TU 3.3.3	53
5695	Weather Net CW TU 3.4.3	68
5742.5	Eniwetok-Kwajalein RATT TU 3.4.3	61
5780	Drone Unit Common Eniwetok TG 3.4	94
6050	Eniwetok-Kwajalein RATT TU 3:4.3	61
6200	Eniwetok-Kwajalein Voice TU 3.4.3	69
6270	Safety & Patrol Net: Guam-Hickam-Johnston-Kwaj-Eniwetok	
6430	Air Route Kwaj. Control & Kwaj-Johnston Airways TU 3.4.3	70, 81

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Freq.		Ckt.
6440	Kwaj-Majuro-Eniwetok-Wake-CTG 3.3-Ctg 3.2 Admin Net	34
6495	Weather Net, CW TU 3.4.3	68
6500	Approach Control, Eniwetok & Kwajalein TU 3.4.3	74A, 74B
6895	Eniwetok-Kwajalein Voice TU 3.4.3	69
6970	Approach Control Eniwetok, Rec only, TU 3.4.3	74A
7305	Air Patrol TU 3.3.3	53
7310	Eniwetok-Los Alamos RATT TG 3.2	35
7365	CTG 3.3-Guam Administrative RATT	50
7645	CTG 3.3-Guam Administrative RATT	50
7685	Weather Recon Net: Eniwetok-Kwaj-Recon a/c TU 3.4.3	71
7720	Eniwetok-Los Alamos RATT TG 3.2	35
7837.5	Drone Unit TG 3.4	98
7870	Air Route Kwaj Control; Guam & Johnston Airways TU 3.4.3	70, 81, 82
7945	SAR TG 3.3	100
8105	Guam Weather Intercept TU 3.4.3; TG 3.4	62, 99
8280	Air Distress Eniwetok & Kwajalein (Voice) TG 3.4	72A, 72B
8330	Warning Net (ARPACAS)	48
8735	Eniwetok-Oahu RATT TG 3.2	36
8750	Kwajalein-Guam RATT TU 3.4.3	79
8785	Weather Net, CW TU 3.4.3	68
8855	ZI-Honolulu-Eniwetok Facsimile Intercept TU 3.4.3	66
8860	Eniwetok-Oahu & Eniwetok-Kwajalein CW TG 3.2	37, 38
8935	Kwajalein-Guam RATT TU 3.4.3	79
9020	Eniwetok-Kwajalein RATT TU 3.4.3	61
9062.5	Eniwetok-Kwajalein RATT TU 3.4.3	61
9070	Kwajalein-Hickam RATT TU 3.4.3	78
9145	Kwaj-Majuro-Eniwetok-Wake-CTG 3.3-CTG 3.2 Admin Net	34
9177.5	Weather Net, CW TU 3.4.3	68
9220	Safety & Control Net: Guam-Hickam-Johnston-Kwaj-Eniwetok	67
9545	Eniwetok-Kwajalein Voice Dispatch TU 3.4.3	69
9680	Eniwetok-Kwajalein Voice Dispatch TU 3.4.3	69
9920	Eniwetok-Oahu RATT TG 3.2	36
9935	Kwajalein-Hickam RATT TU 3.4.3	78
10355	Air Route Kwaj Control; Guam & Johnston Airways TU 3.4.3	70, 81, 82
11230	Drone Unit TG 3.4	98
11275	Eniwetok-Oahu RATT TG 3.2	36
11390	Air Patrol TU 3.3.3	53
11407.5	Safety & Control Net: Guam-Hickam-Johnston-Kwaj-Eniwetok	67
11960	Weather Net, CW TU 3.4.3	68
12010	Eniwetok-Los Alamos RATT TG 3.2	35
12037.5	Eniwetok-Kwajalein Voice Dispatch TU 3.4.3	69
12070	Weather Net, CW TU 3.4.3	68
12285	Kwajalein-Guam RATT TU 3.4.3	79
12400	Eniwetok-Los Alamos RATT TG 3.2	35
12610	Eniwetok-Kwajalein Voice Dispatch TU 3.4.3	69
12745	SAR TG 3.3	100
12922.5	Eniwetok-Oahu RATT TG 3.2	36
12940	Kwajalein-Guam RATT TU 3.4.3	79
12960	CTG 3.3-Guam Administrative RATT	50
12975	TG 3.4	99
13007.5	Guam Weather Intercept TU 3.4.3	62
13075	Air Routes: Kwaj-Guam & Kwaj-Johnston TU 3.4.3	81 82
13327.5	CTG 3.3-Guam Administrative RATT	50
13442.5	Kwajalein-Hickam RATT TU 3.4.3	78
13477.5	ZI-Honolulu-Eniwetok Facsimile Intercept TU 3.4.3	66
14450	Weather Recon Net: Eniwetok-Kwaj-Recon a/c TU 3.4.3	71

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FREQ.		CKT.
15160	Warning Net (ARPACAS)	48
15575	Kwajalein-Hickam RATT TU 3.4.3	78
15805	Safety & Control Net: Guam-Hickam-Johnston-Kwaj-Eniwetok	67
16930	ZI-Honolulu-Eniwetok Facsimile Intercept TU 3.4.3	66
17040	Guam Weather Intercept TU 3.4.3	62
17210	Eniwetok-Oahu RATT TG 3.2	36
17280	Kwajalein Guam RATT TU 3.4.3	79
17470	Kwajalein Guam RATT TU 3.4.3	79
17720	Kwajalein-Hickam RATT TU 3.4.3	78
17852.5	Kwajalein-Hickam RATT TU 3.4.3	78
17870	Eniwetok-Oahu RATT TG 3.2	36
18500	Eniwetok-Los Alamos RATT TG 3.2	35
18737.5	Eniwetok-Los Alamos RATT TG 3.2	35
19695	Eniwetok-Oahu RATT TG 3.2	36
21100	Tank Radio Radiation Test Program	14
21300	Program 6 TG 3.1	15
21810	Guam Weather Intercept TU 3.4.3	62

Frequencies below, are Mcs.

FREQ. (Mc.)		CKT.
24.4	MP Security Control	49
24.5	MP Security Control	49
25.2	Fire and Crash Truck	102
25.5	TG 3.3 Boat Pool Voice	56
25.6	TG 3.3 Boat Pool Voice	56
25.7	TG 3.3 Boat Pool Voice	56
26.1	TU 3.1.2 Command Boat to Gen Comd Site "B"	7
26.2	TU 3.1.2 Hq Site "L" to Command Boat & Work Group	7
26.4	TU 3.1.4 AV-4, LCT's, LCPL's & Weapons Carrier	10
26.5	TU 3.1.4 AV-4 to CP on PARRY ISLAND	10
26.6	H&N Boat Pool Net	12
27.0	TU 3.1.2 Command Boat to Work Group	7
27.1	TU 3.1.2 Command Boat to Hq Site "L"	7
27.2	TU 3.1.2 Work Group to Command Boat and Site "L"	7
27.3	H&N Boat Pool Net	12
27.4	TU 3.1.5 Water Track to RadSafe Hq, Gen Comd. Shot Island	11
27.6	3.1.5 RadSafe	11
27.9	H&N Boat Pool Net	12
30.1	MP—Mobile & Fixed (Voice) TG 3.2	40
31.3	TU 3.4.2 Radio Control Drone Aircraft Operation	83
32.3	" " " " " " "	83
33.3	" " " " " " "	83
34.3	" " " " " " "	83
35.3	" " " " " " "	83
36.8	" " " " " " "	83
37.8	" " " " " " "	83
38.8	" " " " " " "	83
39.8	" " " " " " "	83
40.8	" " " " " " "	83
41.2	Alert Defense Net Emergency Only	39
41.4	" " " " "	39
41.8	" " " " "	83
42.4	" " " " "	39
42.8	" " " " "	83, 39
43.8	" " " " "	83
44.8	" " " " "	83
45.8	" " " " "	83
46.9	Program 1.5.1 Working Party Net TG 3.1	1

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FREQ.		CKT.
47.0	EGG Working Party Net TG 3.1	3
47.05	Program 1.6 working party net (voice) TU 3.1.6	5
47.1	Program 1.6 working party net (voice) TU 3.1.6	5
47.15	TU 3.1.5 RadSafe Survey Parties	11
47.2	" " " " "	11
47.25	H&N Working Party Net	12
47.8	POL Officer, Tank Farm to Ship (voice) TG 3.2	41
47.9	511th Port Co., Harbor Control Net (Voice) TG 3.2	42
65.94	Radio Link for Radar Control (Tone) TG 3.4	84
70.7	Sonobuoy Operating Frequencies (Tone) TG 3.3	57
71.2	FM Radio Link AACS Ops to AACS Xmtrs TU 3.4.3	77
71.8	Sonobuoy Operating Frequencies (Tone) TG 3.3	57
72.2	Radio Link Landline Backup AN/TRC, Eniwetok to Parry TG 3.2	44
73.2	FM Radio Link AACS Ops to AACS Xmtrs TU 3.4.3	77
73.3	TU 3.3.2 Surface Patrol Common	52
74.0	Sonobuoy Operating Frequencies (Tone) TG 3.3	57
76.0	" " " " "	57
77.5	" " " " "	57
78.0	Radio Link Landline Backup AN/TRC/Parry to Eniwetok TG 3.2	44
80.0	" " " " AV-4 to PARRY TG 3.2	45
81.2	Sonobuoy Operating Frequencies (Tone) TG 3.3	57
83.0	Radio Link Landline Backup AN/TRC, PARRY to AV-4 TG 3.2	45
83.94	Radio Link for Radar Control (Tone) TG 3.4	84
84.5	Sonobuoy Operating Frequencies (Tone) TG 3.3	57
85.5	" " " " "	57
86.0	" " " " "	57
86.55	Radio Link for Radar Control (Tone) TG 3.4	84
89.0	Sonobuoy Operating Frequencies (Tone) TG 3.3	57
91.431	Radio Link for Radar Control (Tone) TG 3.4	84
92.0	FM Radio Link AACS Ops to AACS Xmtrs TU 3.4.3	77
93.0	" " " " " "	77
94.0	Radio Link AACS Ops to AACS Xmtrs TU 3.4.3	77
94.8	" " " " "	77
95.4	" Landline Backup SHOT ISLAND to ENIWETOK TG 3.2	46
98.8	" " " ENIWETOK to SHOT ISLAND TG 3.2	46
120.00	Experimental Aircraft, TU 3.4.2	97
120.06	" " " "	97
121.50	Approach Control; VHF D/F; Eniwetok & Kwaj; Exper a/c 3.4.3	97, 100, 73A&B, 74A&B, 76A&B.
121.5	Voice Time	101
124.00	Experimental Aircraft TU 3.4.2	97
124.02	" " " "	97
126.18	Approach Control; VHF D/F, Eniwetok & Kwaj; Exper a/c 3.4.3.	97, 73A&B, 74A&B, 76A&B.
130.00	Experimental Aircraft, TU 3.4.2	97
132.12	" " " " Task Unit Common	97, 104
132.12	Voice Time	101
133.56	Voice Time	97
134.10	VHF Guard Eniwetok TU 3.4.3	96
134.82	Experimental Aircraft TU 3.4.2	97
135.54	NAF Homing Eniwetok TU 3.4.3; Exper a/c TU 3.4.2	91, 97

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Freq.		Ckt.
135.72	NAF Homing Eniwetok TU 3.4.3; Task Group Common	91, 97, 103
135.72	Voice Time	101
136.26	Telemetering, Eniwetok TG 3.4	92
136.88	Air Ground 3.1.4	13
137.7	P2V–B17 a/c to a/c TG 3.1	9
137.88	TU 3.1.5 Hq; Control Tower; Approach Control; & VHF D/F, Eniwetok & Kwajalein TG 3.1 and T.G. 3.4	9, 11, 73A&B, 74A&B, 76A&B.
138.42	Experimental Aircraft TU 3.4.2	97
138.60	" " "	97
139.00	" " "	97
140.40	VHF Guard, Eniwetok TG 3.4	96
140.58	Control Tower; Approach Control; & VHF D/F Eniwetok & Kwaj TU 3.4.3	73A&B, 74A&B, 76A&B
141.66	Experimental Aircraft TU 3.4.2; Ground Cont. Intercept	97, 105
141.66	Voice Time	101
142.10	" " " "	97
142.20	Radio Control Eniwetok TG 3.4; Exper A/c TU 3.4.2	93, 97
142.74	ASW, Air & Surface; a/c common; Time & Warning Sigs TG 3.3	54, 58, 60
143.10	Drone Unit Common Eniwetok TG 3.4; Exper a/c TU 3.4.2	94, 97
143.10	Voice Time	101
144.00	Experimental Aircraft TU 3.4.2	97
148.00	" " "	97
148.50	" " "	97
149.22	Radio Control Eniwetok TG 3.4; Exper a/c TU 3.4.2	93, 97
149.58	Arrestor Station, Eniwetok TG 3.4; Exper A/C TU 3.4.2	95, 97
150.06	Air/Ground 3.1.4	13
151.02	Timing, Eniwetok TG 3.4; Experimental Aircraft TU 3.4.2	92, 97
160.0	TU 3.1.3 (Project 5.2)	8
163.00	" "	8
166.00	" "	8
169.00	" "	8
172.00	" "	8
190.00	TU 3.1.4	10
200	Experimental TG 3.1	6
203	" "	6
206	" "	6
209	" "	6
212	" "	6
215	" "	6
218	" "	6
221	" "	6
224	" "	6
227	" "	6
230	" "	6
254–372	Telemetering-Television (Drone Control) TG 3.4	85
2200–2350	Telemetering for Radar Control TG 3.4	90
2700–2900	Radar Control Positioning Eniwetok (APW–11 & MSQ–1) TG 3.4	
9150	Ships radar Search	89A, 89B
9315	Radar Beacon Eniwetok TG 3.4	88
9345	Radar Search, Eniwetok 3.4	86
9405	Radar Search, Eniwetok TG 3.4	87

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4.1.9 Figure 96 is a sample page of the frequency charts used in the early planning stages before task group frequency requirements were organized into circuits and chronological listing. It later became useful in double checking circuit frequencies and arranging frequencies chronologically; it also aided in giving a fair picture of the frequency spectrum covered by each Task Group.

4.2 Interference

4.2.1 In view of the interference reports of previous nuclear tests in which radio interference caused cancellation of several projects, it was determined necessary to conduct a complete communications rehearsal prior to each shot day. All electronic and communications equipment to be operated on shot day was operated on a schedule as directed in Communications Order No. 1, Hq, JTF-3, dated 31 March 1951 (see Appendix 2 to this report). A direct telephone line was established between the drone unit monitor station and the J-5 Division, Hq, JTF-3 over which all suspected interferences were reported for corrective action.

4.2.2 Severe interference was reported on the 31.3 and 37.8 mc channels during rehearsal for the first shot. This interference was traced to the operation of AN/TRC-1 equipment and as a result, all AN/TRC equipment was silenced during the times when drone aircraft were in the air.

4.2.3 Interference was also reported on 32.3 and 37.8 mc. The interference on 32.3 mc was blamed for theoretical loss of one drone and the extraneous controls interjected into another drone on 37.8 mc were of such nature as to endanger the safety crew. The interference on 38.8 mc was reporting *GY* and *DN* call signs. This was found to be navigational beacons. Interference on 32.3 mc was transmitting letter group *HXR* and was traced to the ARPACAS time signals on 8330 kc.

4.2.4 Additional interference to drone controls was reported on 31.3, 32.3, 37.8, and 36.8 mc as a continuous carrier with an occasional audio "pip". An inspection of the sonobuoy receivers in the sonobuoy hut located approximately 1000 feet from the VHF drone receivers disclosed that the interference on the drone receivers was of the same nature as the carrier received on the sonobuoy receivers from either fish or submerged objects. One sonobuoy transmitter was shut off at a time until these interferences were located.

4.2.5 A final interference test was conducted on the night prior to the first shot by sending one mother drone aloft with the tuning units of all other drone receivers. With all known sources of interference silenced, these tuning units were plugged in one at a time to ascertain trouble-free operation.

4.2.6 On another rehearsal day, a B-17 in flight was used to monitor all channels. The ground monitor station reported no interference on any of the drone control channels but in the air, interference was experienced on the 37.8 and 38.8 channels. Each engine of the B-17 was shut off one at a time and when the No. 3 engine was shut off the interference disappeared. It was found later that this was due to the bonding being left off when the engine cowling was replaced, causing the cowling to act as an antenna generating radio frequency noise. On the 3818 mc channel, interference was found to be caused by VHF radio equipment in the B-17 itself, in which the RF leads were coupled too closely to the tuning unit of the drone receivers.

4.2.7 Numerous cases of interference to drone controls on 31.3 and 32.3 mc channels were caused by ignition and generator noises and in one instance, unauthorized use of an SCR-300 radio set by a working party on one of the shot islands caused interference on 44.8 mc.

4.2.8 Although the Field Order for Operation GREENHOUSE called for the suppression of all vehicles, boats, and power units for ignition, starter, and generator noise, Task Groups did not effectively supervise the suppression of this type of interference. Most of the equipment used at Eniwetok Atoll was not properly suppressed to eliminate interference with sensitive radio receivers.

4.2.9 It is essential that every effort be made to have all gasoline or diesel engines, electric motors such as drill presses, water coolers, adding machines, reefers, duplicating machines and electrical devices capable of generating noise, equipped with suppressors to minimize interference in the frequency range

[redacted]

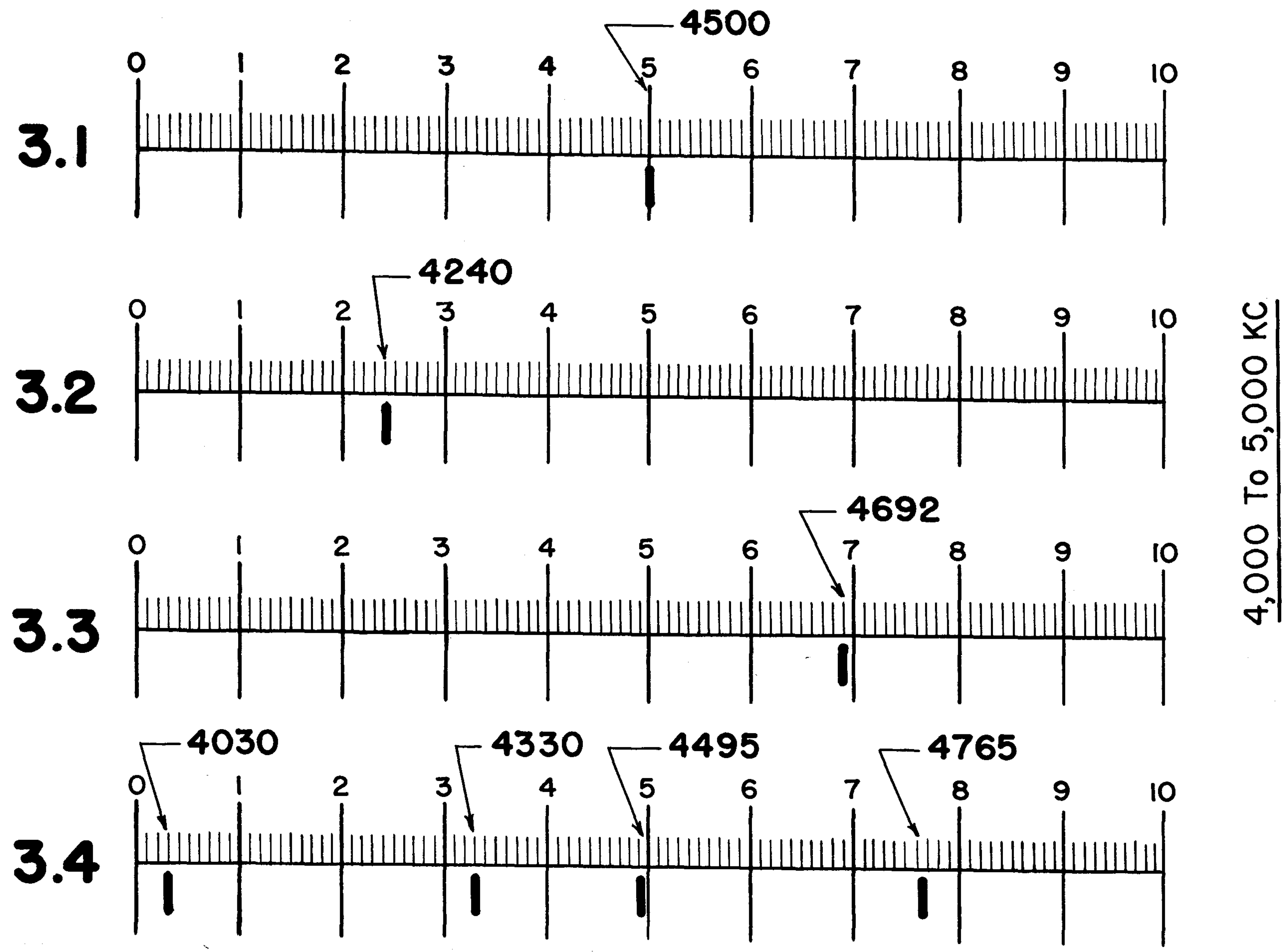

FIGURE 96. Sample of Frequency Assignment Chart for JTF-3

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from 500 kc to 150 mc. Although very little difficulty was experienced in the operation of radio equipment installed in vehicles, the noise emanating from these vehicles caused considerable difficulty in drone control operation. Airplane and automotive technicians should be well versed in the installation of bonding straps, lock-type washers, star-type washers, and all components used in radio frequency shielding on all engines or motors with which they have occasion to work. This is especially true of the continual repairs made on aircraft and automotive engines on which technicians fail to replace these essential items.

4.2.10 The placing of various activities such as machine shops, vehicles, welding apparatus, etc., in strategic locations must be coordinated with the communications officer in the command in which special units are required. Severe interference was caused at the radio receiver station at Eniwetok Island due to the fact that an electric arc welder had been stationed in the vicinity of the Oahu rhombic receiving antenna. Further examples of these were the placing of unshielded or unsuppressed generators in the vicinity of the VHF antennas on Parry Island. Several pieces of equipment used by the contractor were not suppressed by either shielding, capacitor or filter type methods, thus adding quite a problem to the interferences encountered.

4.2.11 For subsequent operations, it is recommended that an electronic countermeasures surveillance detachment of one officer and five (5) enlisted men be included in the Signal Unit of the Army Task Group. This Detachment should operate from a mobile van on Parry Island under the supervision of the Task Force Communications Officer for the purpose of monitoring assigned frequencies to determine the nature and source of electronic interference and recommending corrective action. Its mission would not conflict with traffic monitoring of the Communications Security Detachment.

4.3 Call Signs, Address Groups, and Routing Indicators

4.3.1 Prior to movement of the Task Force to its forward (operational) locations, the Task Force Headquarters was located in Washington, D. C.; Task Group 3.1 at Los Alamos, New Mexico; Task Group 3.2 at Eniwetok Island; Task Group 3.3 at Honolulu, T. H.; and Task Group 3.4 at Eglin Air Force Base, Florida. In these locations communications were passed over Army, Navy, and Air Force fixed communications networks. All Task Groups and Headquarters were assigned routing indicators and address groups contained in JANAP 116 for the purpose of routing traffic.

4.3.2 Because of the tactical designations of units comprising Joint Task Force THREE, the JCEC withdrew all routing indicators and address groups and prescribed that tactical call signs contained in JANAP 112 would be used by all elements of the Task Force when movement was made to the forward area.

4.3.3 Joint Task Force THREE cannot be considered as having been engaged in tactical operations and the use of tactical call signs did not prove satisfactory. Each Task Group was both authorized and encouraged to communicate directly with outside organizations. Without routing indicators and address groups, these Task Groups had no means of identity when passing traffic on fixed communications networks.

4.3.4 It is strongly recommended that the use of JANAP 112 be restricted to internal use only for organizations similar to JTF–3. Address groups and routing indicators are essential for advanced and rear elements of Task Force and Task Group Headquarters.

4.4 Frequency Control

4.4.1 A monitoring room was established in one end of the receiver building to monitor JTF–3 radio transmissions.

4.4.2 Receivers were available, most of which were rack-mounted for the simultaneous monitoring of 33 frequencies from 200 kc to 3,000 mc. Figures 42 and 43 show the rack-mounted receivers which are listed below.

Radio Receiver	No. of Receivers	Frequency Range
NC 100	1	400 kc –
SX–28	6	550 kc – 43000 kc
BC–779	5	2000 kc – 18000 kc
BC–779	1	200 kc – 18000 kc
S–36	8	27 mc – 143 mc
BC–342	2	1700 kc – 1800 kc
SCR–508	5	20 mc – 27 mc
SCR–300	2	40 mc – 50 mc
AN/SPR–1	1	40 mc – 600 mc
AN/SPR–2	1	1000 mc – 3000 mc
AN/SPR–9	1	40 mc – 1000 mc

[redacted]

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4.4.3 The Communications Security Section of the J-5 Division was responsible for the operation and evaluation of data collected from the monitoring room. Three 15 channel recorders were used for this purpose. This provided for the simultaneous recording of intelligence on two 15 channel plastic ribbons; and fifteen additional channels were used as standby for switching-in, where continuous recording was required, or for the playback of recorded intelligence while the other 30 channels were recording.

4.4.4 This multi-channel Recorder-Playback amplifier provided recording amplifiers, playback amplifiers, line amplifiers, erase oscillators, simultaneous monitoring of all channels and controls. Electronic monitors provided for simultaneous selection of intelligence wherever it occurred on any channel. Operating and maintenance personnel were furnished by the Army Task Group and operated under the direction of the J-5 Division, Hq, JTF-3.

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Chapter V

COMMUNICATION SECURITY

5.1 Purpose and Scope

5.1.1 It is the purpose of this chapter to provide a record of the communications security of Joint Task Force THREE in its execution of atomic weapons tests held in the spring of 1951 (Operation GREENHOUSE). It is intended to furnish useful information to those persons who may later participate in communications security activities of a similar nature. Included is information of organization; cryptosecurity; transmission security; physical security, problems, solutions, comments and recommendations.

5.2 Organization and Basic Concept of Mission

5.2.1 Communications security personnel were not assigned as an organic part of Headquarters, JTF–3 and subordinate units, with the primary mission of general communications security as outlined in joint directives. The Communications Security Section as such was originally organized to perform a highly classified security mission, which did not include the performance of a general communications security program. It however, was realized at an early date that successful execution of this special security project, depended to a great degree upon the fundamentals of good communications security. Accordingly, personnel were diverted to the task of general communications security for limited periods of time.

5.2.2 Organization of the Communications Security Section under the (J–5) Communication Division of the Task Force is attached as Fig 97. Previous to this organization, the Communications Security Section was a part of the (J–2) Intelligence Division, with the mission of the aforementioned special security project, but upon the re-organization of Task Force Headquarters which made the communication officer and his staff of division level, it was decided to put this special communications security section under this division as the larger part of its functions involved communications.

5.2.3 This new organization entailed the additional responsibility for general communications security of the Task Force circuits without the assignment of additional personnel. As much time and personnel as was possible, were diverted from the primary mission of this section to the problems of general communication security. Surveys, friendly monitoring, and procedure analysis were performed with the viewpoint of determining the status of security on Task Force communications nets. Considerable time was spent with message writers and releasing authorities on the principles of good message writing and the use of abbreviations as set forth in JANAPS 121 and 132. This is considered as time well spent, as was evidenced by the improvement in general use of communications facilities, although a full time general communications security unit is needed to successfully fulfill the requirements of communications security as outlined in joint directives.

5.3 Use of Communications Facilities

5.3.1 The understanding with which communications are used, has a direct effect upon the security as well as reliability and speed of communications. During Operation GREENHOUSE, the Communications Security Section had opportunity to closely observe the habits of the personnel of the many using agencies. This was attained through examination of several thousands of messages, personal contact with many message writers and monitoring of radio telephone and radio voice circuits.

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ORGANIZATION
COMMUNICATIONS SECURITY SECTION

I LT. COL.	USA	CHIEF
I SFC	USA	CLERK
I CIV	USA	ADVISOR

ANALYSIS BRANCH

I CAPT	USAF	CHIEF
I LT	USN	MONITOR OFF
I WOJG	USAF	ANALYST
I RMI	USN	ANALYST
I TEI	USN	ANALYST
I CPL	USA	DRAFTSMAN
I CPL	USAF	ANALYST

PROCEDURES BRANCH

I MAJ	USAF	CHIEF
I RMC	USN	PROCEDURE ANALYST
I M SGT	USA	PROCEDURE ANALYST

FUNCTIONS
COMMUNICATIONS SECURITY SECTION

INSURES THAT ALL COMMUNICATIONS OF THE TASK FORCE ARE INSTALLED, OPERATED, MAINTAINED, AND USED IN SUCH A MANNER THAT CLASSIFIED INFORMATION PERTINENT TO THE TASK FORCE OPERATION AND MISSION IS NOT DISCLOSED TO UNAUTHORIZED PERSONS THROUGH THESE COMMUNICATIONS.

ANALYSIS BRANCH

1. OPERATES COMMUNICATIONS MONITORING FACILITIES.
2. COLLECTS & EXAMINES MESSAGE TRAFFIC, PASSING ALL VIOLATIONS TO PROCEDURES BR.
3. COMPILES STATISTICAL DATA AND MAKES STUDIES ON MESSAGE TRAFFIC TO DETERMINE SECURITY WEAKNESSES, ADEQUACY OF COMMUNICATIONS FACILITIES AND EQUIPMENT AND RECOMMENDS CORRECTIVE ACTION ON SAME.

PROCEDURES BRANCH

1. MAKES INVESTIGATIONS OF VIOLATIONS AS NECESSARY.
2. IMPLEMENTS PROGRAM OF COMMUNICATIONS SECURITY EDUCATION THROUGHOUT THE TASK FORCE.
3. INSURES THAT PROPER AND SECURE MESSAGE WRITING, HANDLING, CRYPTO, AND TRANSMISSION PROCEDURES ARE FOLLOWED.

FIGURE 97

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5.3.2 Personnel involved represented all three of the military services. Accordingly, a full cross section view of the military was obtained. The reflected ability of Task Force personnel to properly write messages and their understanding of correct use of communications was considered average as is found throughout the services. However, certain problems were encountered with respect to the manner in which messages were written and the procedures used on voice radio circuits. These problems are reported here for edification of personnel concerned with future operations and to point out to all concerned that there is need for further education of our personnel in the business of message writing, assignment of precedence and security classification, general communications security, and better utilization of communications facilities. It is believed that such a program of education would pay big dividends in speedier, more economical and certainly more secure communications. The remaining paragraphs of this chapter contain certain findings which support this belief.

5.4 Procurement and Use of Joint Army, Navy and Air Force Publications

5.4.1 For some reason there exists a feeling that JANAPS are for the use of communications personnel only, whereas the primary purpose of these publications is to provide general information and guidance on U. S. military communications matters for all command and staff personnel. Although the commander and his staff are kept informed on communications matters by the local communications officer, they are nevertheless required to know the basic capabilities and limitations of the various means of communication.

5.4.2 In addition these publications are the basic directives on proper message writing, precedence assignment, security classification assignment, expected speed of transmission of the various means, proper use of abbreviations in communications and general communications security in addition to proper communications operating procedures. Generally, Task Force personnel were not familiar with these directives and in some instances the publications were not available to the using personnel.

5.4.3 Through a survey made by the Communications Security Section, it was found that messages were being presented for transmission which were improperly written, excessively worded and in many cases flagrant misuse of precedence assignment was noted which impaired speed of transmission. As these violations came to the attention of the Communications Security Section, recommendations were made for the procurement of these publications and a general program of orientation in their use, which corrected this matter to some extent.

5.5 AFOAT–1 and ARPACAS Communications

5.5.1 The Air Force conducts a program for the long range detection of atomic explosions. Accordingly, advantage was taken of all tests held at Eniwetok in order to test detection methods. This project was conducted by an Air Force element designated as AFOAT–1. During Operation GREENHOUSE this unit had a requirement for the passing of test time notifications from Eniwetok to AFOAT–1 sub-stations located at various points throughout the Pacific area. In order to meet this requirement a device known as ARPACAS was employed. This device was developed by Army Security Agency, Hawaii, and transmitted prearranged 3 letter code groups each of which had a specific meaning with respect to forthcoming test times. These variable groups provided for a progressive notification starting with "Next 7 days are significant" through "Next 24, 4, 2, and 1 hours are significant" and leading to "Start your program." Groups were provided for the cancelling out of preceding signals and resumption of other progressive signals in the event of a postponement of a test. Broadcast of these signals was started several weeks before the first test date and in fact several weeks before the AFOAT–1 units moved to their stations. to provide the required transmitter and operating test period.

5.5.2 Upon arrival of AFOAT–1 at Eniwetok it was learned that the ARPACAS was not exactly the thing needed to meet the require-

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ment. This system provided no latitude in passing messages other than time signals. There was need to pass several administrative messages concerning logistics, personnel movement, etc. Contrary to an original belief that these sub-stations must have an up-to-the minute test time signal it was determined that this notification could be made through a normal message giving the expected test time several hours in advance. Thus, it was realized that only one communications link was necessary between Eniwetok and these stations and that must be capable of passing literal text messages.

5.5.3 Just prior to the first test it was learned that the ARPACAS transmitter was seriously interfering with operation of drone aircraft electronic controls and it became necessary to discontinue the ARPACAS signals. This was done with no ill-effect to the AFOAT-1 program, however, it was necessary to establish channels of communications with the widely dispersed AFOAT-2 stations. The first test date was drawing near and to introduce a new trend in communications, i.e., linking Eniwetok with several outlying island locations would have no doubt been construed by foreign intelligence exactly as was the fact; some type of data collecting stations were getting in gear in order to record a forthcoming shot. In order to conceal this linkage the following was arranged. Each AFOAT-1 substation was issued a one-time pad encryption system. The other terminal of each system was furnished to an AACS station located between Eniwetok and the sub-station. Thus messages were enciphered at Eniwetok in a system common to the AACS station with internal instructions to pass to the AFOAT-1 station. These same procedures were reversed for messages from the sub-stations to Eniwetok. This system worked satisfactorily from the standpoint of security; however, the re-encryption and relay affected the speed of message transmission.

5.6 Security of the Various Communications Means

5.6.1 Radio Teletype: In a few instances classified traffic was passed in the clear over these circuits. This condition was corrected with the initiation of better in-station handling procedures and briefing of operating personnel. In addition traffic analysis was performed on these long haul circuits to determine the utilization of circuit time, relative handling time in relation to precedence and security classification and proper use of procedures as set forth in JANAPS.

5.6.2 Wire (LAND LINE and SUBMARINE CABLE) Teletype: These circuits were approved for the transmission, in the clear, of traffic up to and including SECRET in accordance with JANAP 122 (A). Extra precautions were necessary at terminal points to preclude this clear text traffic being reflected on radio teletype circuits before encryption. Security in general was very satisfactory.

5.6.3 Voice Radio Circuits: Voice radio nets were used to a large degree on Operation GREENHOUSE. These included such nets as Military Police, Small Boat Pool, Scientific working party nets and Air/Ground Radsafe monitor party nets. For the most part these nets were operated by civilian personnel who were not familiar with the Joint directives and operational procedures and were not fully cognizant of the security of classified matter on voice circuits. This is considered as particularly due to a lack of a widely distributed security classification guide. These nets were monitored and recorded during operational times and units committing violations were notified of such violations through channels. It is believed that a greater degree of security could have been attained if more time and personnel could have been spared for this phase of the communications security program. It is not believed however, that unauthorized parties monitored these facilities because of the short transmitter range involved. All information available through intelligence sources seems to substantiate this belief. General security improved on these nets with each succeeding phase of the operation and the overall security of these nets is considered satisfactory.

5.6.4 Wire Telephone: This facility was cleared for the transmission of information up to and including SECRET. Little time was spent on security monitoring of this facility. Security is believed to have been excellent.

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5.6.5 Radio Telephone: This facility was used as a back-up for the wire telephone system. It was operated on a test-basis about two (2) hours a day to try to familiarize the using agencies and operating personnel with the procedures used in radio telephone and the security implications involved. Security in general was considered satisfactory, although the lack of proper security classification criteria also hampered the user in this type operation. Recommendations in orientation of users and procedures for future use are included at the end of this chapter.

5.6.6 CW Radio Circuits: These facilities were in most cases used for ship-shore communications and as a back-up for radio teletype circuits. The traffic volume in general was light over these circuits. The Communications Security Section did not have trained intercept or monitor operators assigned to the section, however, CW operators were re-assigned from operating units for this purpose. These operators were not trained in the aspects of monitor operations, but from the small amount of CW monitoring accomplished the security of these circuits was very satisfactory and no major violations were noted. For the most part monitor personnel were utilized in operation of recording equipment and monitor teletype machines.

5.6.7 Radio Facsimile Circuits: These circuits were utilized for the transmission of unclassified weather traffic exclusively. As a result the security of material transmitted was not a problem.

5.6.8 Visual Means: The physical security inherent to the Atoll location provided a high degree of security for visual means. All personnel within sight range of any visual signalling were either Queen cleared or were determined as being "Good Security Risks."

5.7 Physical Security of Communications

5.7.1 Communications facilities of Operation GREENHOUSE were either operated on a 24 hour basis, enclosed within secured areas which required special clearances and passes for entry, or under 24 hour guard. As a result no serious breaches of physical security were noted.

5.7.2 Certain administrative practices were considered detrimental to overall security. These included the practice of making multiple distribution on normal category Able messages (See Art. 2330, JANAP 122) of RESTRICTED, CONFIDENTIAL, and SECRET classification. These messages were included in the files of all staff divisions and sections whether or not that division was particularly interested in the message content. This is not in the best interest of the general security of classified matter and is in disagreement with all directives pertinent to this subject. The Communications Security Section made studies, notified responsible authorities and recommended corrective action on this subject.

5.7.3 The burning facilities for classified matter was not considered adequate at the forward area headquarters. Headquarters, Task Group 3.1 and the civilian contractor (Holmes and Narver) used these facilities. Most of the time a stiff breeze was blowing and difficulty was experienced in burning the material. On several instances personnel of the Communications Security Section picked up scattered bits of classified material within the compound (restricted area) and outside the fence. This material was turned over to the Intelligence (J–2) Division for action.

5.7.4 Physical security inspection of cryptographic facilities was the responsibility of the distribution agency, ASA, Hawaii in the forward area and Hq, ASA in Washington. Numerous inspections were made by these agencies and physical security of these facilities was excellent.

5.8 Plain-Text Messages

5.8.1 In August 1950, The Army Security Agency (ASA) made an analysis of all messages transmitted over the Fort Shafter-Eniwetok radio teletype circuit from 1 June 1950 to 31 July 1950. The report of this analysis showed that through compilation of fragments of information found in unclassified messages it was possible to reconstruct classified information pertaining to Task Force operations. The U.S. Air Force Security Service made a similar analysis on limited coverage and its report, although not as comprehensive as the ASA report, confirmed that disclosures of classified information were being made. Failure to properly classify messages and information contained therein is attributed in part to the

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non-availability of a widely distributed security classification guide for Operation GREENHOUSE. The JTF–3 Classification Guide was classified as SECRET-RESTRICTED DATA and as such the distribution was very limited and was not available to the average person writing messages. The publication entitled "Classification Criteria" dated 1 May 1951, filled the needs of message writers, but appeared at too late a date to be effective during the operational phase of the project.

5.8.2 In order to prevent such disclosure a directive was initiated to all elements of the Task Force directing that all messages pertaining to the operation be classified at least RESTRICTED except American Red Cross messages, normal weather messages and aircraft movement messages providing such messages did not disclose significant cargo or passengers. Concurrent with issuance of this directive to the Task Force, a request was made to the three services and the Atomic Energy Commission to promulgate a similar policy throughout their organizations. Response within the Task Force was immediate however, dissemination within the services, particularly the Air Force and Navy was slow. This statement is not made with reflection on any service but is made as a reminder to those who may later promulgate a similar program that such actions should be started as early as possible.

5.8.3 Later analysis of GREENHOUSE messages revealed that this action almost completely eliminated disclosures of classified information through plain-text traffic. The Air Force Security Service in its final report stated "The overall security of the project (relative to radio-teletype traffic) has been excellent and no major leaks of intelligence were noted."

5.9 Evaluation of Communications Security

5.9.1 To obtain a true evaluation of the security of JTF–3 communications it would be necessary to have access to the reports of various foreign powers who are considered to have been interested in this operation and have the required facilities for intercept and analysis of JTF–3 communications. This course of action is impossible, however, the reports of friendly monitoring and analysis facilities were available and were used to great advantage. These included reports from the Army, Navy, and Air Force monitoring and analysis agencies, plus an analysis made by the Armed Forces Security Agency.

5.9.2 These reports indicated that relatively little classified information was disclosed through the external components of enciphered messages. However, in the early stages of Operation GREENHOUSE much information was made available to any unit monitoring Task Force communications circuits through clear text unclassified messages. The directive classifying all GREENHOUSE traffic at least RESTRICTED precluded the disclosure of classified matter through compilation of fragments of information and is deemed to have been the largest single factor contributing to the overall communications security.

5.9.3 A day by day surveillance of security practices within the Task Force was made by the Communications Security Section and indicated that generally security rules were followed. At no time was a violation found that could have seriously endangered the overall security program of the Task Force. Accordingly, the communications security of Operation GREENHOUSE is considered to have been very satisfactory.

5.10 Conclusions

Provisions were not made for the assignment of personnel to perform the functions of general communications security, as a result, these functions were performed by personnel with another mission that required their primary efforts. Accordingly, it is concluded that a more comprehensive program, coupled with adequate personnel whose primary mission was general communications security would have paid dividends in more secure and rapid communications. The organization shown in Figures 98 and 99 is considered as the minimum to perform the functions of general communications security in the manner prescribed by joint directives. This organization is based upon cellular teams for communications security organizations taken from Department of the Army TO & E 32–500 and upon the findings and experience

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gained during Operation GREENHOUSE. This recommended organization would be fully capable of performing the functions that could not be performed by the Communications Security Section, on a full time basis, during Operation GREENHOUSE, with the dual mission and limited personnel available. This organization would be able to successfully perform the following general functions:

a. Monitor all Task Force communications circuits on a 24 hour basis including the following type circuits:

1. Radio-teletype
2. Landline teletype
3. Radio-telephone
4. Voice Radio
5. CW Radio

b. Collection and analysis of all data obtained from monitor facilities, to include procedure and security analysis.

c. Evaluation of procedure and security violations, notification to offending units and follow-up to determine corrective action taken.

d. Planning and implementation of an educational program for all concerned to include proper communication operations procedures, correct message writing, proper assignment of precedence and security classification of messages, security and speed of transmission means and general communication security.

e. Planning for adequate cryptographic holdings and netting, and the implementation of these plans to include continued surveillance of cryptographic netting and facilities with respect to keeping current with communications traffic and security requirements.

f. General physical and cryptographic procedural security.

g. The compilation of statistics on communications traffic and the portrayal of these statistics in the required form to conduct studies on message routing, adequacy of facilities and equipment, and determination of traffic trends for better utilization of existing facilities.

5.10.2 The late procurement and orientation in the use of Joint Army, Navy, and Air Force Publications (JANAPS) was detrimental to communications security. This was reflected in the operation of voice radio circuits, general message writing procedures, assignment of precedence to messages, use of approved abbreviations, and knowledge of transmission means. A general schooling program in the use of JANAPS would have resulted in speedier, more economical and more secure communications.

5.10.3 There exists a dire need for a simple and widely distributed Security Classification Guide for the use of all personnel. If personnel had been able to properly classify messages as to security of content, it is believed that it would not have been necessary to issue the directive that all messages to the Task Force be classified at least RESTRICTED, thus resulting in large savings in cryptographic personnel and equipment.

5.10.4 It is not believed that a need will exist for a time encryption device similar to ARPACAS inasmuch as AFOAT-1, the principal user, has stated that in the future all its units will be located on military installations and use will be made of existing communications facilities on these installations.

5.10.5 The facilities for the destruction of classified correspondence, including messages was not adequate. Planners should take this matter into consideration for coordination with responsible authorities.

5.10.6 General communications security would have been more thorough within the subordinate task groups if a responsible well trained communications security officer had been assigned to the staff of the task groups with this function as his primary job.

5.11 Recommendations

5.11.1 The organization as outlined in Figure 98 is recommended as the organization necessary to perform the functions of communications security for a Task Force with similar facilities and mission to Joint Task Force THREE. The requirement for personnel to fill this organization, should be submitted through the Joint Chiefs of Staff and be furnished as a trained unit by one of the services.

5.11.2 In addition to the organization shown in the chart, Figure 98, it is recommended that one (1) field grade officer, preferably a lieutenant colonel, with one (1) administrative assistant, enlisted, be assigned as staff communications security officer of the Task Force Headquarters. This officer would

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perform the function of coordinating within and outside the Task Force and be responsible for overall planning for communications security.

5.11.3 It is recommended that a well trained communications security officer be assigned to the staff of each of the subordinate task groups. This officer would coordinate and initiate communications security functions within the task group to which assigned.

5.11.4 It is recommended that the necessary Joint Army, Navy, and Air Force Publications (JANAPS) be procured and distributed at an early date. This subject should be made a part of the administrative order, with the Adjutant General of the Task Force as the procurement and distribution authority within the Task Force. In addition a general schooling program in the use of JANAPS should be planned and implemented by the communications security section as early as possible.

5.11.5 It is recommended that a simplified security classification guide be published and distributed to all using agencies, for the security classification of all matters. This guide should not be classified higher than CONFIDENTIAL otherwise the desired distribution cannot be made.

5.11.6 Recommend that an incinerator of adequate size and construction be designed and built for the destruction of classified matter at the forward area headquarters.

5.11.7 Recommend for future operations that as long as there is a need to pass literal text messages to the AFOAT–1 stations and it is not necessary to broadcast up-to-the-minute test time signals, only one communications routing be established for this purpose. This routing should be established well enough in advance so as to not introduce new transmission and geographical positions at such a time that they could be significantly linked with test times.

RECOMMENDED ORGANIZATION FOR COMMUNICATION SECURITY

While the organization shown here is not considered as the only workable organization, it is recommended as a guide in providing a suitable communication security unit.

FIGURE 98 COMMUNICATIONS SECURITY SECTION

Security Control Team (GZ)

1 Captain	9240
1 MSgt	0807
*1 Sgt	1213

Monitor and Collection Branch

Radio Security CW & HF Voice Monitoring Team (GO)

1 Lt	0501
1 Sfc	0766
2 Sgt	0766
3 Cpl	0766
2 Pfc	0766

FM Voice Radio Security Monitoring Team (GQ)

1 Lt	0503
1 Sfc	0538
2 Sgt	0538
3 Cpl	0538
2 Pfc	0538

AM Voice Radio Security Monitoring Team (GP)

1 Lt	0503
1 Sfc	0538
2 Sgt	0538
3 Cpl	0538
2 Pfc	0538

General Security Branch

Security Analysis Team (GV)

1 Lt	9605
1 Sfc	0709
1 Sgt	0709
2 Cpl	0709

Cryptographic Security Team (GH)

1 Captain	9240
1 Sgt	0805
1 Cpl	0805
2 Pfc	0805

All teams taken from Army TO & E 32–500

*Augmented from other sources.

FIGURE 99

Function of Teams Assigned Communications Security Section

a. GH Team—Cryptographic Security

Studies general cryptographic security as practiced by units of the headquarters to which it is assigned and the physical security of code rooms and cryptographic material.

b. GO Team—Radio Security CW & HF Voice Monitoring Team

Monitors friendly manual CW and AM voice MF and HF radio transmissions from the security standpoint. (2 Positions)

c. GP Team—AM Voice Radio Security Monitoring Team

Monitors friendly AM voice radio transmissions from the security standpoint. (2 Positions)

d. GQ Team—FM Voice Radio Security Monitoring Team

Monitors friendly FM voice transmissions from the security standpoint. (2 Positions)

e. GV Team—Security Analysis

Analyzes monitored friendly transmissions, both radio and wire from the security standpoint. Prepares reports on the caliber of security practiced by various communications nets within an assigned area and makes recommendations for improvement of transmission security.

f. GZ Team—Security Control

Provides personnel necessary to direct and supervise the activities of combined communication security teams.

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Chapter VI

CRYPTOGRAPHY

6.1 Crypto Facilities

6.1.1 The following cryptographic facilities were established during Operation GREENHOUSE. Actual systems held are set forth in the Crypto-Holders Chart Figure 100.

6.1.2 Headquarters, JTF–3 Washington, D. C. This facility was established primarily to eliminate the time delay on processing and delivery of messages between Hq, JTF–3 and Dept of Army Crypto Center, which was the crypto-guard for Hq, JTF–3. One-time tape systems were used between these two points for transmission of classified traffic.

6.1.3 Headquarters, Task Group 3.2 located at Eniwetok Island. This facility serviced TG 3.1 prior to the opening of facilities on Parry Island and TG 3.2 and TG 3.4 throughout the project.

6.1.4 Headquarters, JTF–3 located on Parry Island, this facility furnished crypto services for JTF–3 headquarters and TG 3.1. It was originally planned that this facility would serve all ground and air echelons during the operational phase. The Eniwetok Island facilities were to be put on a standby basis with classified traffic, (below TOP SECRET) transmitted in the clear to and from Parry Island crypto facilities on approved wire circuits. However, the classified traffic load was so heavy, that it was necessary to continue the operation of the Eniwetok crypto facilities throughout the entire project. This would probably not have been the case had all requested "Q" Clearances for crypto personnel been obtained on time.

6.1.5 Hq, TG 3.3 located aboard the AV–4. This crypto facility served the Navy echelon only, and was a Navy class V facility.

6.2 Crypto-Operations

6.2.1 Considerable difficulty was experienced at the Parry Island facility due to the special handling and processing required for AEC one-time tape systems. This evolved from the necessity for only a limited number of designated personnel being authorized to operate this system, also the operational procedures for AEC TOT systems differed from the military procedures and special instructions were necessary for operating personnel. Tracer action, re-runs and re-encipherments were necessary in many cases which contributed in a large degree to delays in traffic handling. Re-encipherment was necessary on traffic destined for AEC addressees other than Los Alamos or Hq, AEC, Washington. This re-encipherment was accomplished by the Los Alamos Crypto Center and a high percentage of re-runs and re-encipherments was required by the Los Alamos facility on this type traffic originating at Eniwetok Atoll.

6.2.2 Special handling procedures and security practices were necessary for processing of Communications Intelligence traffic. The processing of this type message traffic was limited to one (1) man and required a special crypto-system for this use only. The crypto-room had to be cleared of all personnel except the designated operator during the processing of this traffic. Special storage facilities were necessary for this system and only the designated operator had access to this system.

6.2.3 Special processing was necessary on project "DRILLPRESS" and "PERSONAL FOR" messages. Incoming "DRILLPRESS" messages were delivered directly to the Communications Security Section upon de-cipherment in a sealed envelope. Outgoing messages of this type were delivered directly to the code room in a sealed envelope with rout-

[redacted]

[redacted]

FIGURE 100. CRYPTO HOLDERS CHART OPERATION
Corrected

SYSTEM OR CHANNEL	AFSAK 2100	AFSAK 2104	AFSAK 2110	AFSAK 2122	AFSAK 2400	AFSAK 2401	AFSAK 2464	AFSAK 2476	AFSAK 2544	CSP 1270		ASAT 515/516	ASAT 529/530
AEC LOS ALAMOS	x		x			x		x	x				
DEPT ARMY	x	x	x		x	x	x	x	x				x
DEPT NAVY			x		x	x			x	x			
DEPT AIR FORCE	x	x	x		x	x	x	x	x				
EGLIN AFB			x			x		x	x				
SFPE	x	x	x			x	x	x	x			x	
LOS ANGELES COMMCEN(ARMY)	x		x			x		x	x				
USARPAC	x	x	x		x	x	x	x	x	x			
ASA HAWAII	x	x	x		x	x	x	x	x	x			
USAFPAC; 1810, 1957 AACS	x	x	x			x	x	x	x	x			
1859 AACS JOHNSTON IS	x	x	x			x	x	x	x	x			
1960 AACS KWAJALEIN	x	x	x			x	x	x	x	x			
CNOB KWAJALEIN			x			x			x	x			
CINCPAC/CINCPACFLT; COMSERPAC			x	x	x	x			x	x			
COMHAWSEAFRON			x	x	x	x			x	x			
COMSUBPAC			x		x	x			x	x			
COMAIRPAC			x		x	x			x	x			
CJTF–3	x	x	x		x	x	x	x	x	x			
CTG 3.1 LOS ALAMOS	x	x	x						x				
CTG 3.2	x	x	x	x	x	x	x	x	x	x		x	x
CTG 3.3 (USS CURTISS)			x	x	x				x	x			
CJTF–3 WASH DC	x	x	x				x	x					
LOOKOUT MT. LAB, HOLLYWOOD			x						x				
AEC WASH DC			x						x				
HQ SIXTH ARMY, SAN FRAN	x	x	x										

ing instructions contained on the outside of the envelope. "PERSONAL FOR" messages were delivered directly to the code room in sealed envelopes. Incoming "PERSONAL FOR" messages were processed and delivered to the addressee in person. Special files were necessary on these types of messages to care for instructional documents and servicing purposes.

6.2.4 Military Sea Transport Service traffic was made difficult by the inadequate distribution of crypto-systems to these ships. At times in the forward area it was impossible to pass traffic to these ships because some of them did not hold the required systems and it was considered necessary to put a security classification on the traffic. The cause of this difficulty is the outgrowth of the intergradation of the ships of the Army Transport System into the Military Sea Transport Service. At that time the Army Transport crypto-systems were withdrawn and in some cases have never been replaced. This problem has been coordinated with CINCPAC but as yet is not entirely corrected.

6.2.5 Space was very limited in the forward area crypto rooms. This condition was the result of the procurement of additional equipment after the space planning had been accomplished and the building constructed. The limited space hampered personnel in operation of equipment.

[redacted]

ONE TIME TAPE SYSTEMS																		
ASAT 531/532	ASAT 933/934	ASAT 937/938	ASAT 939/940	SIGJSG/SIGDRB	SIGOOB/SIGPGW	ASAT 398/399	ASAT 908/909	ASAT 939/940	ASAT 941/942	ASAT 943/944	ASAT 945/946	ASAT 947/948	ASAT 949/950	ASAT 951/952	ASAT 953/954	AECAHYD/AECJHHV	AECGRVL/AECOVOP	AECJEMT/AECPVBO
																x	x	
											x							
													x					
				x						x								
	x													x				
			x			x	x	x	x	x	x	x	x	x	x	x	x	x
		x					x					x						
x	x	x	x	x	x			x										
x									x									
						x												
															x			
																		x
					x													

6.3 Crypto Maintenance

6.3.1 Considerable maintenance problems were encountered during Operation GREENHOUSE due to climatic conditions in the forward area. Preventative maintenance was performed on a daily basis which for the most part solved these problems. This required the full time utilization of one crypto-maintenance technician at each crypto-center in the forward area. The crypto-facilities were enclosed in a concrete vault and ventilation was difficult due to the physical security requirements in accordance with current directives. The temperature and humidity was higher inside these vaults than in other parts of the building. This was due to the heat generated by operating equipment and the close proximity of operating personnel. It is believed that a de-humidifying system for use within these facilities is necessary in the interest of cutting down maintenance problems and improving operating conditions.

6.4 This paragraph will attempt to cover some of the more predominant errors and characteristics of message writers and the functions for which messages were utilized:

6.4.1 Clearance Messages.

6.4.1.1 The Commander in Chief, Pacific (CINCPAC) was responsible for the security of Eniwetok Atoll as it concerned the movement of aircraft, vessels, their passengers and

crews into the Eniwetok Area. A CINCPAC letter (Serial 0116) was issued on 25 October 1950 containing security instructions for such movements. Each time an individual entered the area a multiple address classified message was sent from the individual's parent organization to various units along the path of entry. Due to the number of people involved and the frequency of movement this requirement contributed greatly to the volume of message traffic. This volume was far greater than that planned for in drawing up plans for crypto communications. During a one month representative period more than fifty percent of all messages sent and received by the Eniwetok Atoll Commander were in compliance with this letter. These facts are reported here for those who may later be concerned with planning for similar communications. The Intelligence Division of JTF–3 was not satisfied with the procedures for such clearances and will no doubt make recommendations for change in its report. Regardless of any changes which may be made there will still be a requirement for communications. These procedures should be examined early in order to estimate the contemplated volume of traffic which will incur.

6.4.2 Message Supply Requisitions.

6.4.2.1 Within a one hour period the supply section of one Task Group drafted ten (10) messages addressed to the same organization (an Air Depot), each message having similar precedence and classification, each containing internal passing instructions to a specific section of the depot, and each requesting a single item of supply. These messages were identical in all respects except the statement of description of the requested item and the difference of a few minutes in each date-time-group. Members of this supply section were asked why a single message, listing all requested items was not used. The answer was that Air Depots do not like to receive message requisitions which contain items of a different supply class. A thorough examination was made to determine the percentage of superfluity in sending these ten messages rather than one. This revealed a 4 to 1 ratio, or in other words approximately 720 groups were typed, enciphered, transmitted, deciphered, re-enciphered transmitted and deciphered whereas had the request for all items been contained in a single message the handling of approximately 180 groups would have been required. Here is a case of the communications system being abused in order to serve the whims and fancies of a depot which apparently has no conception of the extra, unnecessary burden and cost placed on the communications system. There is no authority for requesting such action.

6.4.3 Precedence.

6.4.3.1 An early examination of several hundreds of messages indicated that there was misunderstanding with respect to the rules for selection and designation of message precedence. One major fact was outstanding, i.e., the ratio of PRIORITY to ROUTINE and DEFERRED was about 3 to 2. It did not appear reasonable that there should be such a high proportion of PRIORITIES. Contact with several message writers at that time revealed a feeling maintained by many that one must assign a high precedence or otherwise the message had little chance of being transmitted in a reasonable period of time.

6.4.3.2 Discussion was held with several persons who believed that the designation of precedence was a directive to the addressee indicating the speed and priority with which the recipient must take action and/or make reply. The abuse and misuse of precedence was considered to have an adverse effect on security. It not only caused unnecessary congestion in communications centers but gradually brought about a state within the communications centers of only casual attention being paid to PRIORITY and even OPERATIONAL IMMEDIATE messages. This is normal when operators see such a large proportion of messages being designated high precedences.

6.4.3.3 The Communications Security Section made this matter of precedence a point of continued examination and education throughout the operation. A spot examination was made in the headquarters of one Task Group. Outgoing messages for a one week period were examined. During this period 86 messages were originated of which 4 were OPERATIONAL IMMEDIATE, 50 PRIORITY, 30 ROUTINE and 2 DEFERRED. The ratio of

PRIORITY to lower precedences appeared out of balance. A close examination was made of each message with a view to justifying each precedence designation. Little could be determined from the content of each message, however, an examination of drafting, release and filing times revealed that hardly one of these messages could justify the PRIORITY designation. In one case the time spent in passing the message from the desk of the drafter, through the releasing officer, to the transmitting means was 62 hours and 45 minutes. THIS WAS A PRIORITY. The average time of these 50 PRIORITY messages from drafter to means of transmission was 4 hours and 33 minutes. These writers were directing communications operators to "Place this message before all ROUTINE AND DEFERRED ones," yet the writer took no action to ascertain that the message was expedited to the communications center. Similar studies were made in the Task Force Headquarters and similar results were obtained.

6.4.3.4 Many persons in writing messages failed to consider the difference between local time and the time at the addressee location. As an example, the difference between local Eniwetok and local Washington time was such that Washington offices were closing for the evening at about 1000 hours local time Eniwetok. Accordingly between 1000 and 2000 local Eniwetok there was little reason to give a message a precedence higher than DEFERRED unless the writer wanted to get the addressee out of bed to make delivery. The attention of all message writers was drawn to this fact and there resulted a noticeable increase in the number of DEFERRED messages and consequently a decrease in PRIORITIES. These facts are brought out here for the benefit of those who may later be concerned with a similar situation. It is believed that if a stringent program of education and close supervision in the use of precedence would be initiated within the military services much of the congestion of communications circuits would be eliminated.

6.4.4 Short Reply.

6.4.4.1 JANAP 121 (A) ART 1554 provides that until a fully protected state of communications is ordered, certain short (one word) unclassified replies may be made to classified messages. Outside the Navy elements of the Task Force these replies were rarely used. Consequently many messages were enciphered unnecessarily whereas had the short reply been used the message would have bypassed the crypto center thus reducing the crypto work load.

6.4.5 Cite Numbers.

6.4.5.1 Each message outgoing from the Task Force Headquarters carried as the first phrase of the text a letter-number combination known as the "Cite" or reference number. The inclusion of this phrase was considered by the communications security element of the Task Force as redundant and unnecessary. No reason could be found for not using the message date-time group for reference. The only justification for use of the "Cite" number seemed to lie in tradition and possibly in the ease with which the message center records could be maintained. If it would be possible to compile the number of enciphered groups required for this phrase and to further compile the man hours and material spent in its typing, encipherment and other necessary processing it would be found quite costly. Inasmuch as each message must have a date-time group, and this group will adequately suffice and is authorized for purposes of reference, (See JANAP 121 (A) ART 1541) it seems that the unnecessary inclusion of a "Cite" number is an added expenditure without justification.

6.4.6 Brevity.

6.4.6.1 If the principle of brevity would have been conscientiously employed by message writers a great reduction in the length of communications particularly enciphered messages, would have resulted. This was not the case. Generally, writers made little attempt to write in a concise manner. Consequently, cryptographic operators were continuously performing additional unnecessary work; on occasion the crypto work load reached such a volume that messages were delayed as much as 14 hours before crypto processing could be performed. It is not intended to imply that verbosity in message drafting was the only nor the primary factor which caused an abnormal crypto work load. It is intended to point out

[redacted]

that if a greater attention would have been paid to brevity the work load would have been nearer normal. All corrective measures tend to reduce delays all along the line.

6.5 Crypto Netting for Weather and AFOAT-1 Stations

6.5.1 This presented a problem at a late date in the operational phase of Operation GREENHOUSE. Weather project control authorities state in the early planning for weather stations that cryptographic facilities would not be necessary and were not desired, however, a requirement was needed for transmitting classified information to the stations at a later date. After consideration no action was deemed necessary due to the late date of the operation. Provision of one-time pads with each weather detachment would have eliminated the confusion.

6.5.2 AFOAT-1 stations were issued one-time pad systems during the operational phase of this project. The other holder of these systems were various AACS stations who in turn re-enciphered the traffic and passed the traffic to JTF-3, this re-encipherment was necessary to prevent disclosure of originator-addressee linkage in accordance with a classified security project.

6.6 Authentication System

6.6.1 This authentication system Figure 101, was taken from Joint Document JSC 100. Cards with general instructions were printed by the Armed Forces Security Agency and delivered to the Task Force. Task Group Signal Officers were required to prepare different mixed alphabets based on a selected word for each period of use and stamp this alphabet with the numerical value of each letter on the card. There was actually little use made of the authentication system, however, it was used by the military police in confirming telephone calls on the entrance of personnel to an exclusion area.

FIGURE 101

THE AUTHENTICATION SYSTEM

Confidential AUTHENTICATION CHART

The authentication chart on the reverse side may be used whenever it is desired to check the authenticity of the distant party. Each chart will be effective for a maximum of 24 hours, beginning at 0001 hours Eniwetok time (1201 GCT) on the date indicated. Each chart is classified CONFIDENTIAL and will be safeguarded accordingly. Upon supersession, charts will be destroyed by the holder. No report of destruction is required.

INSTRUCTIONS FOR USE: To challenge, give two random letters (using PHONETICS on Voice Circuits). To reply, locate the two letters in the table and add their numerical values using the numbers below the letters. Count to the right after the second letter of the challenge, the number of letters equal to that sum. If the end of the alphabet is reached before counting stops, continue from the beginning of the alphabet. The letter upon which the counting stops is the reply given (in PHONETICS on Voice Circuits).

EXAMPLE: SAMPLE TABLE ONLY—DO NOT USE FOR AUTHENTICATION.

A	D	W	C	L	E	Q	H	O	I	J	K	M	N	S	P	B	V	R	G	Z	T	F	X	Y	U
3	1	1	4	5	2	1	4	3	2	5	2	3	1	1	4	5	2	1	4	3	2	5	3	2	1

CHALLENGE:	HJ	REPLY:	G
	LE		M
	FZ		W
	ZF		L

6.7 In October 1950, a directive was issued to all Task Force elements to classify all messages transmitted by radio at least RESTRICTED. This action necessitated the encipherment of all radio messages and placed a load of about fifty (50%) above normal on all crypto facilities of the Task Force. This action was judged necessary by the disclosures of classified information through compilation of scattered bits of information in clear text messages.

6.7.1 This problem is believed to be a result of the very limited distribution of the JTF-3 "Classification Guide," as this guide was classified as "SECRET-RESTRICTED DATA." At a very late date a comprehensive

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and inclusive guide was published with a CONFIDENTIAL classification which clarified the writers' concepts of security classification and materially reduced the load on crypto facilities. Message drafters and communications users must be educated in the security classification of all classes of matter for the operation.

6.8 On-line conference facilities were provided for classified conferences but were used in only a few instances. It is believed that off-line conference facilities would serve the purpose for which this facility was intended with equal efficiency if procedures utilized an exchange of questions in advance of the actual conference time. All participants in conferences held agree that off-line facilities would suffice for their purposes and it was not necessary to have on-line facilities there by tieing up the radio teletype circuits for extended periods of time.

6.9 Procurement of Equipment for Use With One-Time Tape Systems

6.9.1 In some instances one-time tape systems were issued to holders who did not have the necessary SIGTOT equipment (131–32 tables) to operate these systems. After the systems were distributed this fact was learned and efforts which proved futile, were made to secure the equipment, which is a Signal Corps item and in short supply.

6.10 Crypto Holders Chart

6.10.1 The normal distribution of the crypto-holders chart was inadequate to units outside the Task Force that communicated with the Task Force or its elements. Task Group 3.2 published a holders chart and distributed it to the principal using agencies. This did much to eliminate the confusion in units not familiar with the Task Force and its organization.

6.11 Peak Traffic Load Times

6.11.1 Surveys made of traffic loads in crypto-rooms indicated that message originators were filing messages either on their way to lunch or at the close of the working day. A typical workday showed that twenty-five (25) messages were filed for transmission in approximately forty (40) minutes. If the originator could be educated to file the message as soon as it was written, traffic would flow in a normal manner and delays in encipherment and transmission would be less frequent and lengthy.

6.12 The following recommendations are hereby made, based upon the facts presented herein:

6.12.1 Task Groups 3.1 and 3.4 should install, operate and maintain their own cryptographic facilities.

6.12.2 Ascertain that the necessary equipment and devices are available and/or supplied to all organizations concerned with Task Force communications before special crypto systems are issued i.e., one-time tape systems.

6.12.3 Issue crypto systems, in accordance with its needs, to all units or elements of the Task Force who are stationed in isolated locations and for which no crypto guard is available.

6.12.4 Ascertain that MSTS ships are supplied with proper crypto systems prior for departure to Eniwetok Atoll.

6.12.5 Adjust the crypto procedures for AEC systems to conform to military procedures for like systems.

6.12.6 Assure the promulgation of the crypto-holders chart direct from Task Force Headquarters to the using agencies and encourage units outside the Task Force to coordinate their communications problems with the Task Force Communications Officer.

6.12.7 Ascertain that a thoroughly distributed and comprehensive security classification guide is published and distributed at an early date.

6.12.8 Eliminate on-line conference facilities and substitute off-line facilities for the use of the staff in forward area to Zone of the Interior and vice versa conferences.

6.12.9 Provide for and install dehumidifying or air conditioning equipment in the crypto rooms.

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Chapter VII

WIRE CIRCUIT ASSIGNMENT AND OPERATION

7.1 The J–5 Division, Hqs, JTF–3 was charged with the responsibility for coordination and assignment of all point to point wire circuits exclusive of administrative telephone service including the allocation of pairs in the inter-island submarine and buoy cable system. Repeated efforts were made thru Hq, TG 3.1 to obtain the wire circuit requirements of the various scientific contractors and program directors prior to the operational phase without success. Scientific Program Directors and contractors submitted cable pair requirements direct to the Holmes and Narver wire chief who made random assignments as requested prior to the arrival of Hq, JTF–3 in the forward area. Upon arrival of the J–5 Division in the forward area it was necessary to make minor reassignments to meet operational requirements. Fortunately sufficient cable pairs were available to meet all requirements because time would not have permitted reinforcement of the cable system had this been necessary.

7.2 A complete list of special point to point, inter-island and buoy cable wire circuit assignments employed during Operation GREENHOUSE may be found in Appendix 10, Annex "F" (Communications), Field Order #2, Hq, JTF–3. See Appendix 1 to this report.

7.3 Telephone plant cable records were maintained by the Army Task Group wire chief on Eniwetok Island and by the Holmes and Narver wire chief for Parry and all other islands. These records are on file at the respective telephone exchanges. Copies of these records are in the files of the J–5 Division Hq, JTF–3 and will be retained in the permanent files of the succeeding Task Force.

7.4 Considerable difficulty was experienced by the contractor in operating and maintaining the telephone system on islands other than Eniwetok. This was due primarily to the contractors' inability to obtain trained operating and maintenance personnel. Had it not been for the assistance (cable splicing in particular) given the contractor by Task Group 3.2, essential service would have been delayed for extended periods.

7.5 Telephone service during the operational phase was poor, particularly on Parry Island and between Parry and Eniwetok Islands. Subscribers reported long delays, disconnections, and other inconveniences caused by equipment overloading, and poor operator training (see Section II & III of this report). In order to improve service between Parry and Eniwetok, Headquarters, JTF–3 on Parry Island was given ten (10) extensions off of the Eniwetok switchboard. These were provided as inter-island cable pairs were available which could not be used for trunking as all trunking jacks on the Parry switchboard were in use. Numerous direct lines were installed to eliminate the poor exchange service as a factor in essential operational communications.

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Chapter VIII

TRAFFIC

8.1 General

8.1.1 This chapter is concerned with message traffic. It is the purpose here to give the reader an idea of message traffic characteristics including: various types of messages; volume, number of originators; number of writers; flow of traffic and originators served by each communications center. Information contained here pertains to operation in the forward (Eniwetok Atoll) area only.

8.2 Communications Centers

8.2.1 Two major communications centers served all Task Force elements located in the Eniwetok Atoll. These were located on Parry and Eniwetok Islands. Both were established, maintained, and operated by the 7127th A. U. Communications Detachment. All message traffic external to the Atoll was processed and transmitted from the Eniwetok Communications Center until 1 March 1951 when this function was taken over by the Parry Communications Center, a graphic presentation of traffic handled by these facilities are shown on charts *102, 103* and *104*. A traffic routing diagram is shown on chart *105*. Task Group 3.3 operated a Communications Center aboard the USS CURTISS. This center was capable of performing crypto functions; however, when the vessel was anchored in the Eniwetok Lagoon it was connected to the land based communications centers by approved (cable) teletype and telephone circuits. When this connection was made all classified off-atoll TG 3.3 traffic was passed to the Parry Island Communications Center for encryption, as necessary. When not anchored in the lagoon, VHF FM radio circuits were used between the CURTISS and Parry Island. Accordingly, encryption and de-cryption was performed aboard ship. Task Group 3.4 operated a small communications center, less cryptocenter. All crypto functions for this group were performed by the Eniwetok Communications Center.

8.2.2 The Parry Island Communications Center served the following units:

- Task Force Headquarters.
- Task Group 3.1 and all of its elements including the civilian contractor, Holmes and Narver.
- Task Group 3.3 as necessary and as explained above.

8.2.3 The Eniwetok Communications Center served the following units of the Task Force:

- The Atoll Commander. (During the construction phase.)
- Task Group 3.2 and all of its elements.
- Certain advance elements of Task Group 3.3.
- Task Group 3.4. and all of its elements less those located at Kwajalein.
- The civilian contractor, Holmes and Narver prior to the opening of the Parry Island Communications Center (19 Feb 51).
- U. S. Coast Guard Loran Station located on Eniwetok Island.

8.3 The Following Off-Atoll Circuits Were Operated

8.3.1 Eniwetok-Oahu duplex radio teletype. This circuit terminated at Oahu in the major relay station (UHP) operated by USARPAC, and at Parry Island in the Parry Communications Center (UHPJ) after 1 March 1951. Prior to this date it terminated at the Eniwetok Communications Center.

8.3.2 Oahu-Eniwetok CW, this circuit was established as a back-up for the circuit above,

COMBINED TRAFFIC VOLUME 1950-1951
OPERATION GREENHOUSE

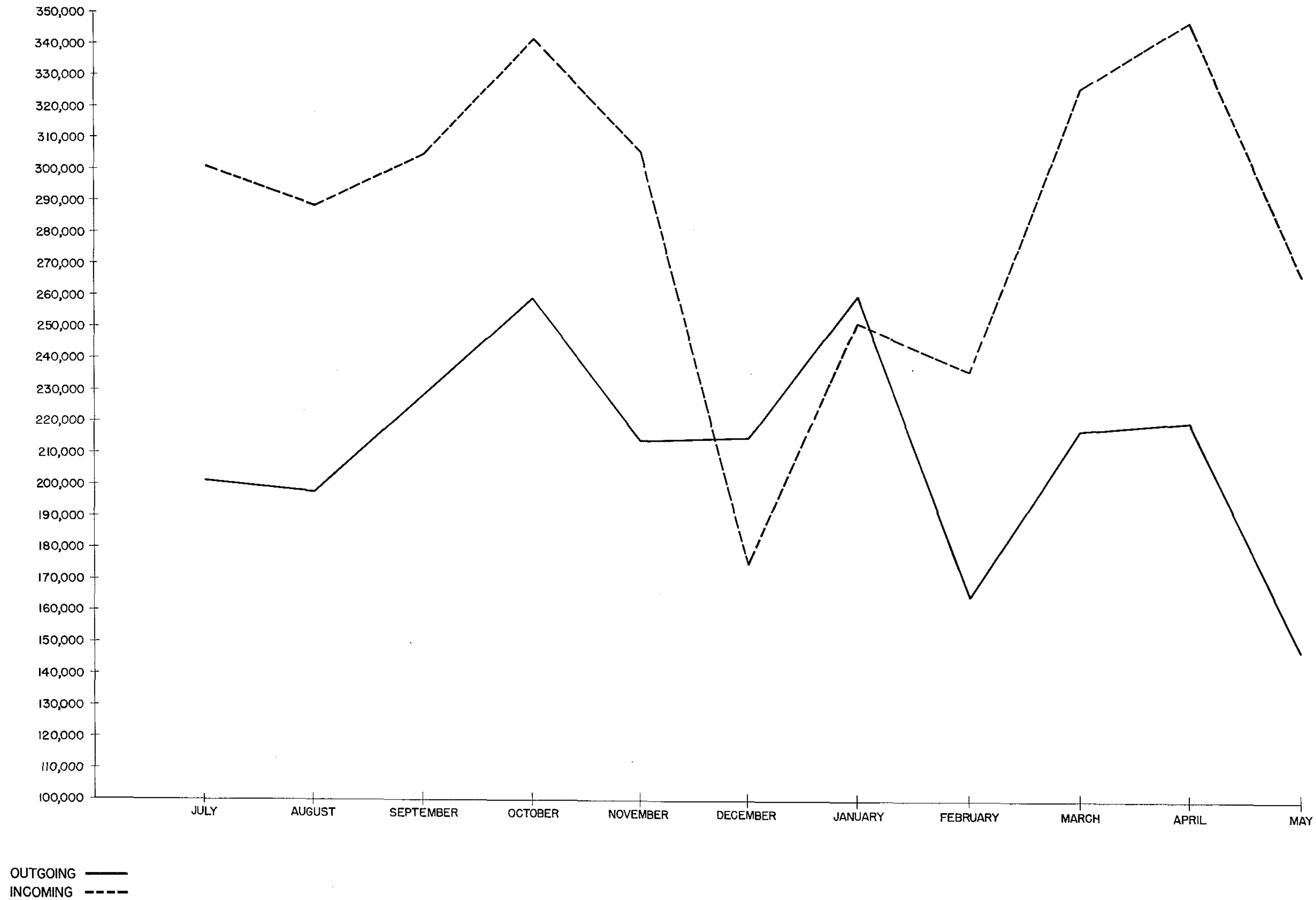

FIGURE 102

OUTGOING TRAFFIC BY PRECEDENCE & CLASSIFICATION OPERATION GREENHOUSE

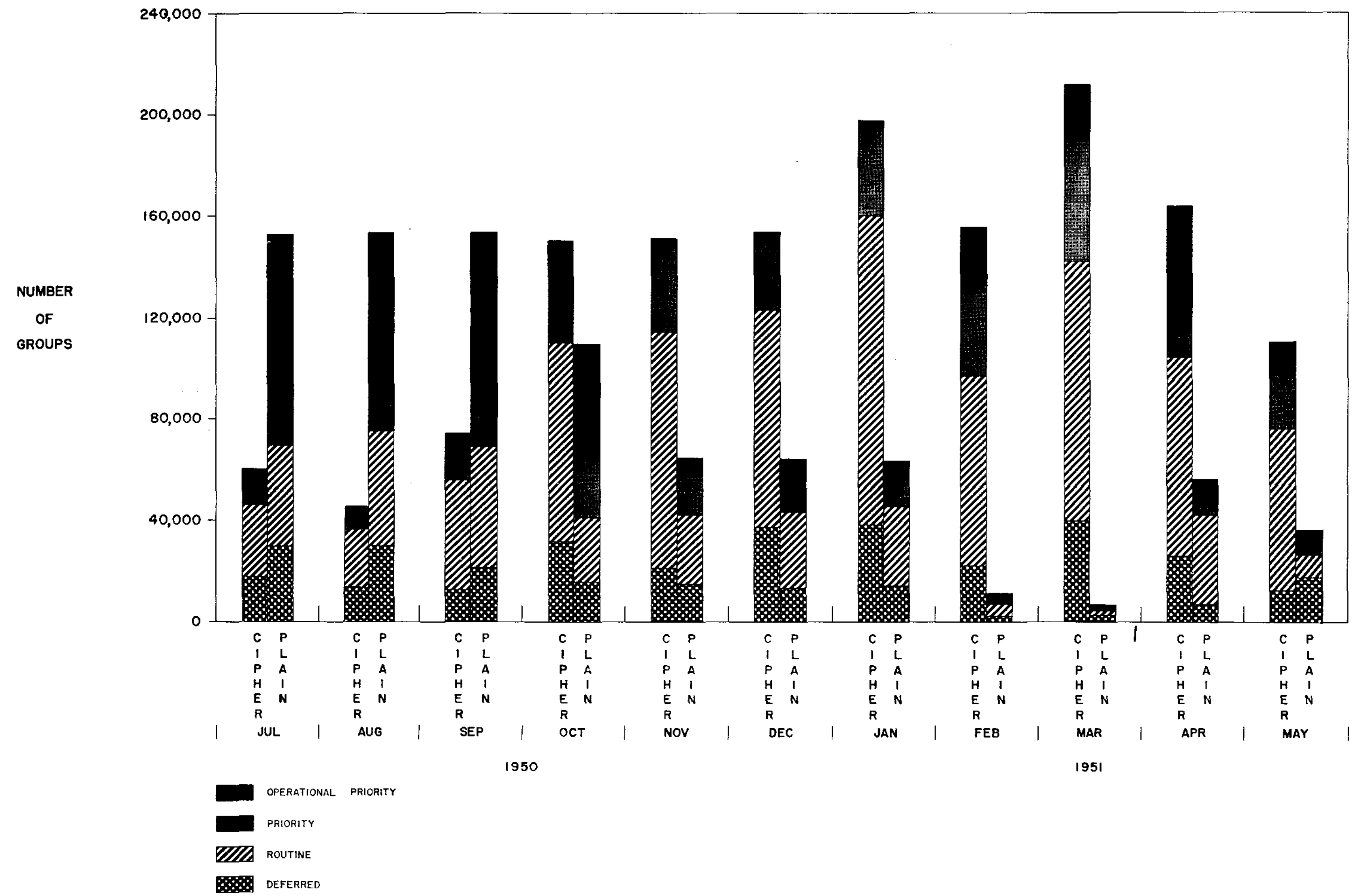

FIGURE 103

[redacted]

INCOMING TRAFFIC BY PRECEDENCE & CLASSIFICATION OPERATION GREENHOUSE

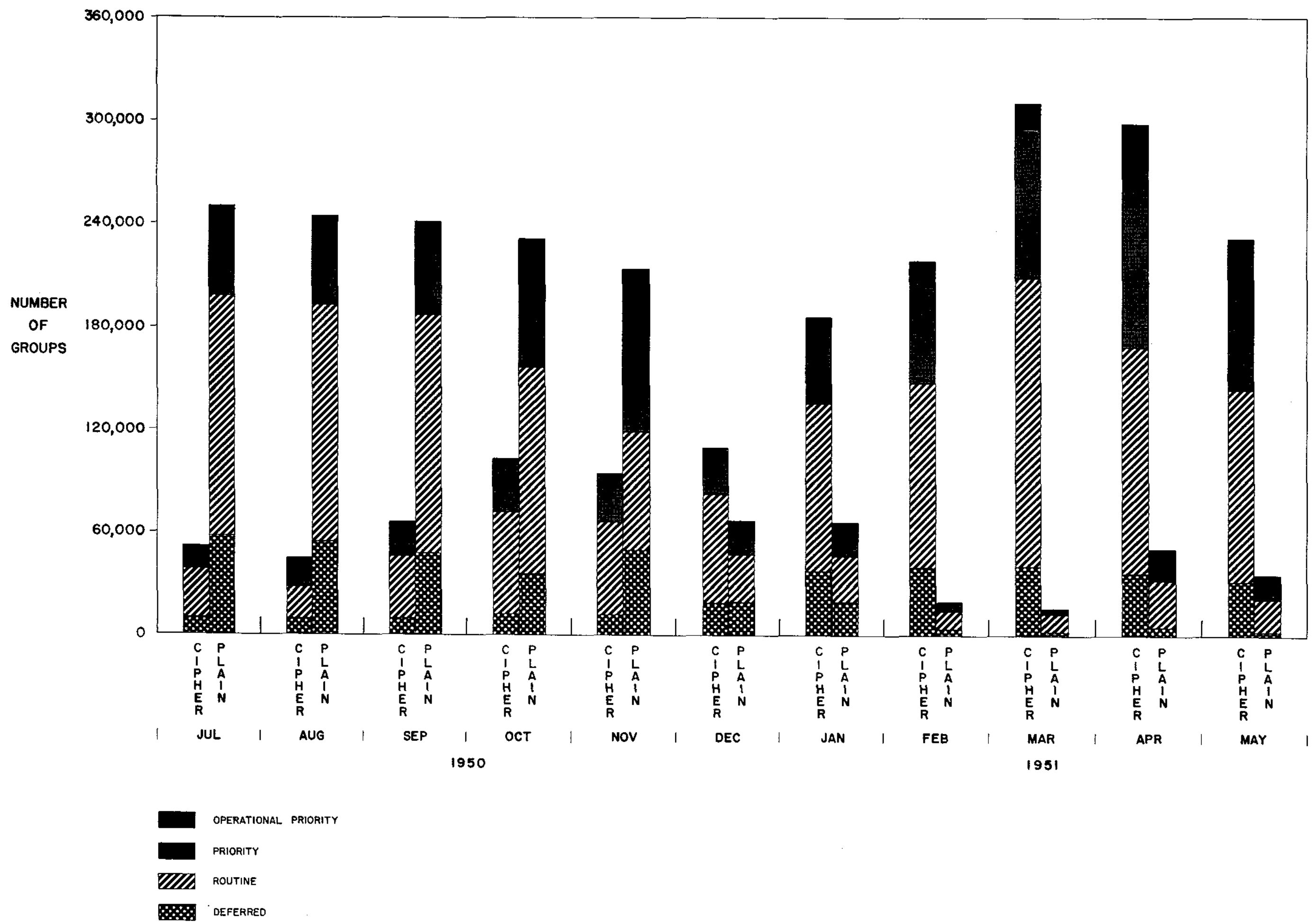

FIGURE 104

[redacted]

COMMUNICATIONS TRAFFIC DIAGRAM CENTERED ON ENIWETOK

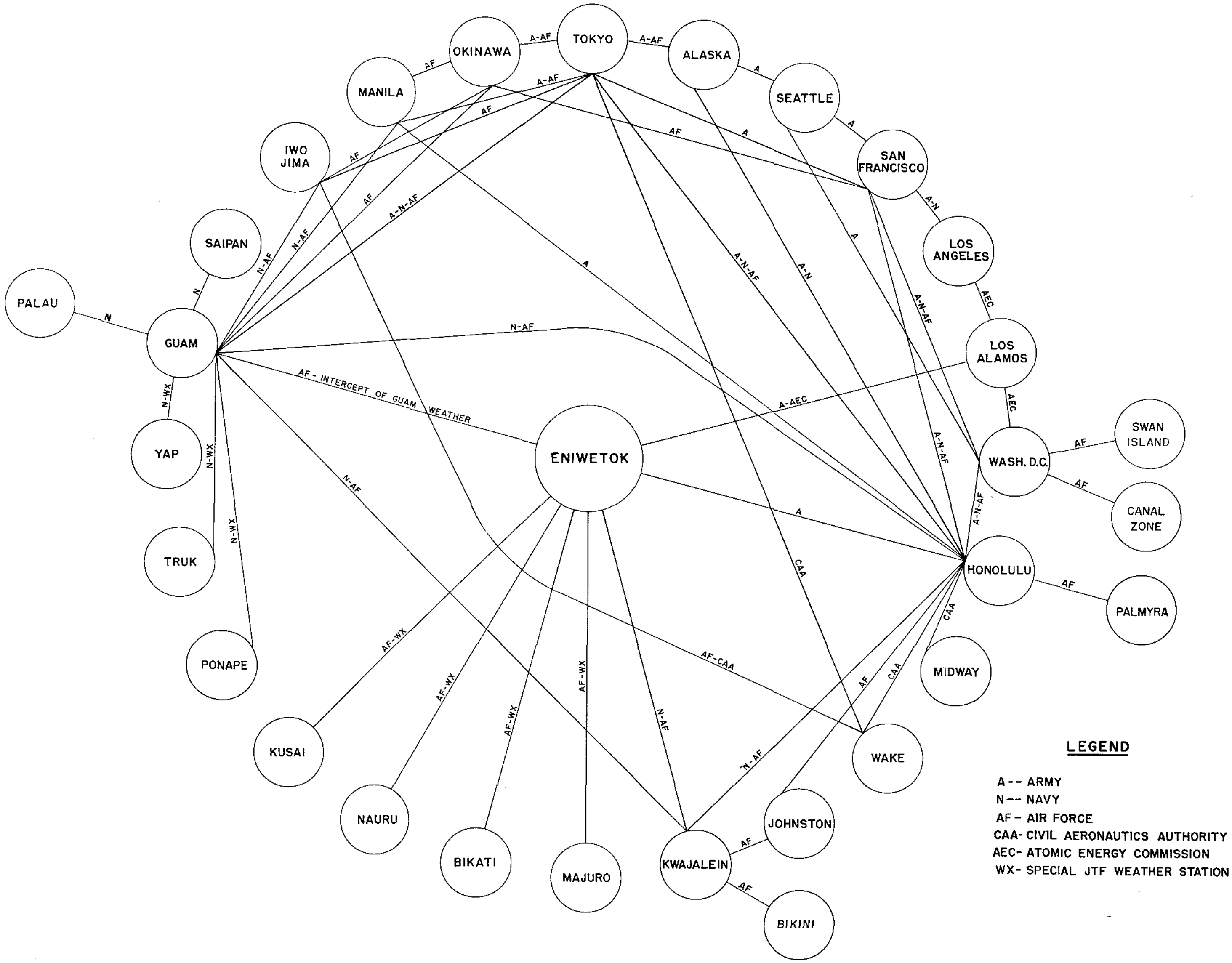

FIGURE 105

[redacted]

and terminated in the receiver building on Eniwetok.

8.3.3 Los Alamos-Eniwetok duplex radio teletype. This circuit terminated with AEC at Los Alamos. Prior to 19 February 1951, the Eniwetok end terminated in the Eniwetok Communications Center, after which time it was terminated in the Parry Island Communications Center.

8.3.4 Kwajalein-Eniwetok duplex radioteletype. This circuit terminated at Kwajalein in the Joint Communications Center and at Eniwetok in the TG 3.4 Communications Center.

8.3.5 Kwajalein-Eniwetok CW (P–33), this circuit terminated at Kwajalein in the receiver building of NOB Kwajalein and at Eniwetok in the Task Group 3.2 receiver building on Eniwetok Island. During the operation TG 3.3 utilized this circuit as well as TG 3.2; the circuit was never fully loaded.

8.3.6 Task Group 3.3 Guam. This circuit was never established however, frequencies and equipment were kept in readiness in case activation of the circuit was necessary.

8.3.7 Ship to shore CW and voice. These circuits were operated from the Eniwetok receiver station and terminated with any nearby vessel as necessary.

8.4 Intra-Atoll Circuits

8.4.1 No attempt will be made here to list and explain all circuits which were established to inter-connect various elements within the atoll. Such information appears at other phases in this report. A few of these circuits are significant with respect to transmission of literal messages . . . . An explanation of these follows:

8.4.2 Task Group 3.4 Communications Center located on Eniwetok Island was connected with the Eniwetok Communications Center by a wire circuit, approved for transmission of *SECRET* traffic. This circuit facilitated passage of off-atoll TG 3.4 traffic to the Eniwetok Communications Center for encryption and transmission. That classified traffic originated by TG 3.4 and destined for Kwajalein or to be passed over the Kwajalein-Eniwetok radio teletype circuit was transmitted in the clear over this wire circuit, enciphered by the Eniwetok Center, transmitted back over the wire circuit for transmission by TG 3.4. Service could have been improved; SIGTOT equipment was not available at Kwajalein although tapes were available.

8.4.3 The Parry and Eniwetok Communications Centers were connected by wire circuits. This facilitated passage of classified traffic in the clear (up to SECRET) between elements located on the two islands.

8.4.4 Prior to the opening of the Parry Communications Center a wire circuit was established between the Eniwetok Communications Center and Holmes and Narver offices on Parry Island. This was discontinued when the Parry Communications Center opened as messenger service was used for Holmes and Narver traffic.

8.5 Types of Messages

8.5.1 The following are types of communications traffic which were authorized special handling procedures or processing. Each type had its own peculiarities, however, authorizing the special handling of each within the crypto or communications centers imposed an unreasonable burden on operating personnel.

8.5.1.1 DRILLPRESS Messages were used in a highly classified security program and required special processing and security measures. The outgoing message was sent directly to the code room enclosed in envelopes with transmission instructions contained on the outside of the envelope. After encipherment the message was processed as a normal administrative message. Incoming DRILLPRESS messages were deciphered in the code room, put in envelopes and delivered directly to the Communications Security Section, J–5 Division.

8.5.1.2 GREENHOUSE ROCKET Messages were patterned after the Air Force REDLINE message, which required that they take handling in the Eniwetok Area but a few were processed in the Washington Headquarters of JTF–3. This procedure was published by the AG, JTF–3 in a special letter.

8.5.1.3 PERSONAL FOR Messages required special in-station handling. The statement PERSONAL FOR followed by the name of the

[redacted]

[redacted]

person to whom the message will be delivered is inserted as the first line of the text and only that person is authorized to receive the message. The originator will be informed if delivery cannot be made.

8.5.1.4 OPX Messages were of OPERATIONAL IMMEDIATE precedence and concerned the PXing of aircraft, and have precedence over other OPERATIONAL IMMEDIATE Messages.

8.5.1.5 EXPEDITIONARY FORCE (EFM) Messages are of prearranged text for which the sender may have transmitted a choice of three (3) phrases for $0.75. This traffic was handled as ROUTINE precedence traffic and was routed into commercial channels at Hawaii.

8.5.1.6 AFOAT–1 Traffic required special routing so as not to link the addressee with the originator and required reencipherment at relay points. Relay stations and out-stations held one-time pad crypto systems. Normal crypto systems were used between JTF–3 and relay points.

8.5.1.7 PROGRAM 8.3B Traffic required special routing to various stations. It also caused confusion in the communications centers as the messages consisted of a special four (4) letter prearranged code and the communications center personnel were in some instances not briefed in advance on this type traffic.

8.5.1.8 PERSONAL EMERGENCY Messages were initiated after coordination and approval of the office of the Chief Signal Officer. These messages were reflected into commercial circuits at the nearest point of transfer and were collected for at the destination from the addressee. This type message was necessitated due to the lack of commercial facilities at Eniwetok.

8.5.1.9 CLASS EASY Messages are normally Navy personal messages, however, before special arrangements were made for personal emergency traffic some of these messages were reflected on JTF–3 circuits "on collect at addressee basis."

8.5.1.10 RED CROSS Messages were handled as normal administrative messages in accordance with authorized procedures set up throughout the armed forces.

8.5.1.11 SPECIAL INTELLIGENCE Messages required special handling and were processed by only one code clerk and delivered to only one designated person within the headquarters. This type message also had its own cryptographic system.

8.5.1.12 RESTRICTED DATA Messages required a special one-time tape system which was set up by the AEC for handling RESTRICTED DATA. This held the distribution of this data to a minimum as the encipherment was performed by specially designated personnel.

8.5.1.13 BLUE STREAK Messages were used only by the Air Task Group for notification of failure to complete mission, grounded aircraft, etc., and normally carried a precedence of EMERGENCY.

8.5.1.14 HOT SHOT Messages were for certain operational command traffic within the Air Task Group. This designation indicated the type of in-station handling and routing to addressee and redistribution over WX circuits. In general they bypassed the AG, etc., going directly to the communications center.

8.5.1.15 SITREP Messages were periodic intelligence reports and were handled in a normal manner until deciphered. Distribution was limited to the (J–2) Intelligence Division and no ditto copy was made. Information within these messages carried all security classifications.

8.5.1.16 PRESS Traffic did not require a ditto. It was made up in three (3) teletype copies and special distribution was made to using agencies.

8.5.1.17 WEATHER Traffic entailed several different types, all of which had pre-arranged addressees and distribution. For the most part it was of OPERATIONAL IMMEDIATE precedence. Each type had internal designators which to the experienced weather personnel told what type it was and what dissemination.

8.5.1.18 HOLMES AND NARVER Traffic required special in-station handling procedures. Special logs and files were necessary inasmuch as a concurrent number system was used by H & N, and if a number was missing an easy system of checking was available through these logs and files.

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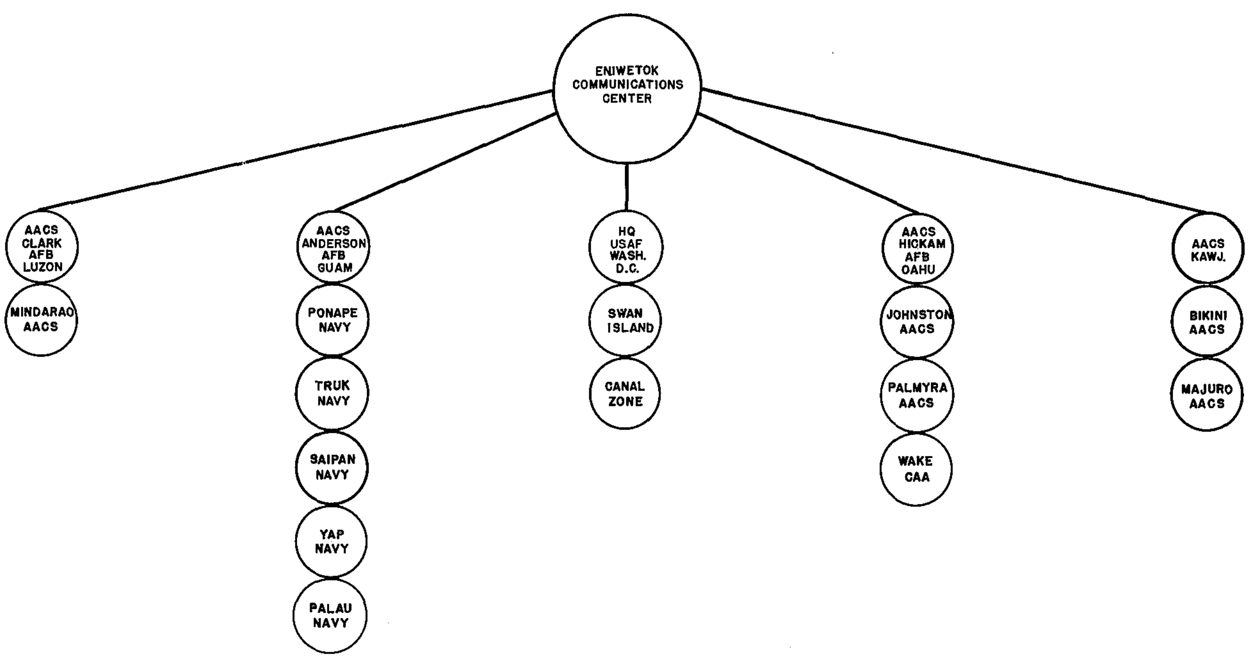
8.5.1.19 MILITARY SEA TRANSPORT SERVICE Traffic caused considerable trouble during Operation GREENHOUSE. Some of the MSTS vessels arriving at Eniwetok did not hold crypto systems and traffic could not be passed to them. This situation still has not been corrected in full and coordination is still being carried on.

8.6 AFOAT-1 Traffic (Figure 106)

8.6.1 At a very late date (15 March 1951), AFOAT-1 came up with a communications requirement for which little planning had been done. It was found necessary to establish a means of transmission of classified literal text messages to and from an AFOAT-1 representative on Eniwetok and AFOAT-1 stations at Mindanao, Ponape, Truk, Yap, Palau, Johnston, Palmyra, Wake, Bikini, Majuro, Washington, D. C., Swan Island, and the Canal Zone. It was determined that it would be detrimental to the security of both GREENHOUSE and the AFOAT-1 projects if there suddenly appeared a direct communication linkage between Eniwetok and these stations. An arrangement was made to provide each AFOAT-1 station with one half of a one-time pad encryption system, the other half of which was given to an AACS station. Messages were enciphered in a crypto-system common to Eniwetok and the AACS station. The AACS re-enciphered the message using the one-time pad, eliminating all original external addressee originator indicators, and transmitted it to the AFOAT-1 stations over established circuits. Reverse procedures were used for messages originating at AFOAT-1 stations addressed to Eniwetok. This arrangement

MESSAGE TRAFFIC DIAGRAM FOR AFOAT I



ALL MESSAGES FOR AFOAT-I ACTIVITIES WILL BE ADDRESSED TO EITHER AACS CLARK, ANDERSON, HICKAM OR KAWJALEIN WITH INTERNAL INSTRUCTIONS FOR PASSING TO THE AFOAT-I ACTIVITY. MESSAGES WILL THEN BE REENCRYPTED IN ONE TIME PAD FOR PASSING.

REVERSE THIS PROCEDURE FOR MESSAGES TO AFOAT-I ENIWETOK.

FIGURE 106

[redacted]

was not fully satisfactory either from a security or traffic passing standpoint. Several errors were made which may have compromised the intended security. One AACS unit had extreme difficulty in understanding the necessity for reencipherment as a security measure. One AFOAT-1 station prepared a message in pad and rather than address it to the AACS station, addressed it to *Dr. Rock*, Eniwetok, Marshall Islands. The map on the following page shows the widespread dispersion of AFOAT-1 stations. It is recommended to future Task Force communicators that it be kept in mind that requirements such as this will come up at a very late date. In this case it is believed that AFOAT-1 did not clearly understand the problem and assumed that communications systems exist which will answer any type of requirement, and that no planning was required.

8.7 Hq, JTF-3 Traffic

8.7.1 During the period 1 February to 30 April 1951, headquarters, JTF-3 originated 1598 messages. During this period 1560 incoming messages were received. A breakdown of these messages showing the number sent to and received from each addressee is shown below. This information should assist future planners.

From Headquarters, JTF-3 (Forward) to	Number of Msgs
Administrative Hqs, Washington 25, D.C.	325
CTG 3.1, Post Office Box 1663 Los Alamos, New Mexico	149
Commander-in-Chief, Pacific and United States Pacific Fleet c/o Fleet Post Office San Francisco, California	141
CTG 3.4, Eglin AFB Florida	131
CTG 3.3, c o CINCPAC c/o Fleet Post Office San Francisco, California	120
CTG 3.2, APO 187 c/o Postmaster San Francisco, California	103
Commander, Naval Operating Base Navy Number 824 (eight-two-four) c/o Fleet Post Office San Francisco, California	102
Commanding Officer Hickam Air Force Base APO 953, c/o Postmaster San Francisco, California	96
Commander, Pacific Division of MATS APO 953, c/o Postmaster San Francisco, California	82
Liaison Officer, JTF-3 Travis Air Force Base California	78
Chief of Staff, United States Air Force Department of the Air Force Washington 25, D.C.	45
U.S. Atomic Energy Commission Post Office Box 1663 Los Alamos, New Mexico	36
U.S. Atomic Energy Commission 1901 Constitution Avenue, NW Washington 25, D.C.	28
Commanding General United States Army, Pacific APO 958, c/o Postmaster San Francisco, California	25
Department of the Army Washington 25, D.C.	21
Chief of Naval Operations Department of the Navy Washington 25, D.C.	19
1960th AACS Squadron Navy Number 824 (eight-two-four) c/o Fleet Post Office San Francisco, California	17
Commander, Military Sea Transport Service 33 Berry Street, San Francisco 7, Calif.	17
Commander Military Air Transport Service Andrews Air Force Base Washington 25, D.C.	14
Commander MSTS, Middle Pacific c/o Fleet Post Office San Francisco, California	13
1808th AACS Wing APO 925, c/o Postmaster San Francisco, California	13
Commander Fourteenth Naval District c o Fleet Post Office San Francisco, California	12
Commanding Officer Bolling Air Force Base Washington 25, D.C.	11

Incoming traffic to Headquarters, JTF-3 (Forward) from	
Administrative Hqs, Joint Task Force THREE Washington 25, D.C.	351

From Headquarters, JTF-3 (Forward) to	Number of Msgs
CTG 3.3, c/o CINCPAC Fleet Post Office San Francisco, California	169
Commander, Pacific Division MATS APO 953, c/o Postmaster San Francisco, California	106
Commanding Officer Hickam Air Force Base APO 953, c/o Postmaster San Francisco, California	104
Commander-in-Chief, Pacific and United States Pacific Fleet c/o Fleet Post Office San Francisco, California	100
Commander Task Group 3.4 Eglin Air Force Base Florida	98
1960th AACS Squadron Navy Number 824 (eight-two-four) c/o Fleet Post Office San Francisco, California	84
Liaison Officer, JTF-3 Travis Air Force Base California	55
Commander, Naval Operating Base Navy Number 824 (eight-two-four) c/o Fleet Post Office San Francisco, California	55
Holmes and Narver Honolulu, Oahu, T.H.	45
Department of the Army Washington 25, D.C.	45
CTG 3.1 Post Office Box 1663 Los Alamos, New Mexico	32
Commander Services Forces, Pacific Fleet c/o Fleet Post Office San Francisco, California	31
Commander, MSTS, Middle Pacific c/o Fleet Post Office San Francisco, California	30
U.S. Atomic Energy Commission 1901 Constitution Avenue NW Washington 25, D.C.	29
Movement Report Center c/o CINCPAC c/o Fleet Post Office San Francisco, California	26
Commanding General United States Army, Pacific APO 958, c/o Postmaster San Francisco, California	23
Commanding Officer Naval Supply Center Oakland, California	23
Commander, Military Sea Transport Svc. 33 Berry Street San Francisco 7, California	22
Army Navy Shipping Information Agency San Francisco Port of Embarkation Fort Mason, California	21
CTG 3.2 APO 187, c/o Postmaster San Francisco, California	20
Chief of Staff, United States Air Force Department of the Air Force Washington 25, D.C.	20
Commander Military Sea Transport Service Main Navy Building Washington 25, D.C.	18
Air Transport Squadron THREE c/o Fleet Post Office San Francisco, California	16
Commander Military Air Transport Service Andrews Air Force Base Washington 25, D.C.	15
Naval Air Station Navy Number 824 (eight-two-four) c/o Fleet Post Office San Francisco, California	11
Commanding General San Francisco Port of Embarkation Fort Mason, California	11

8.8 Air Task Group Traffic

8.8.1 The Air Task Group 3.4 located on Eniwetok Island was equipped to process the following types of traffic: Teletype, facsimile, manual (CW), and radiotelephone. Message center, teletype, and facsimile were grouped under one supervisor. Illustrations of the terminal facilities installed for these types of traffic are shown in Figure 107, Radioteletype Relay Circuits; Figure 108, Teletype Installations; and Figure 109 Facsimile Installation.

8.8.2 The CW section included the Eniwetok-Kwajalein Voice Radio circuit, Figure 110; the air-route air-to-ground circuit; the weather reconnaissance air-to-ground circuit, Figure 111; the ground point-to-point Weather Net, and CW weather intercept. The weather circuits are shown in Figure 112.

8.8.3 Voice radio was also utilized in the control tower in the approach and airdrome

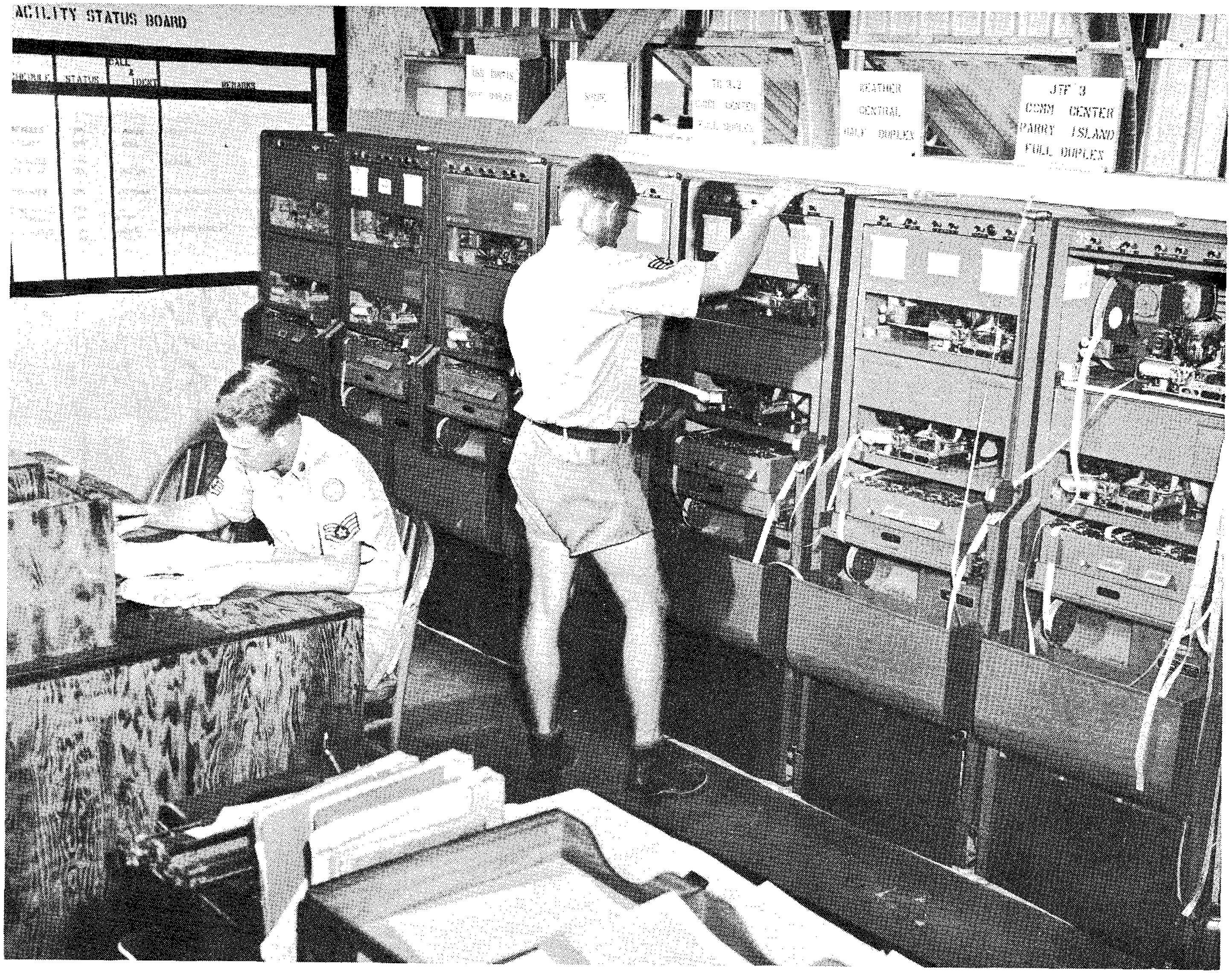


FIGURE 107. Teletype Terminal Facilities ATG 3.4 Communications Center, Eniwetok Island

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FIGURE 108. Teletype Communications Center ATG 3.4, Eniwetok Island

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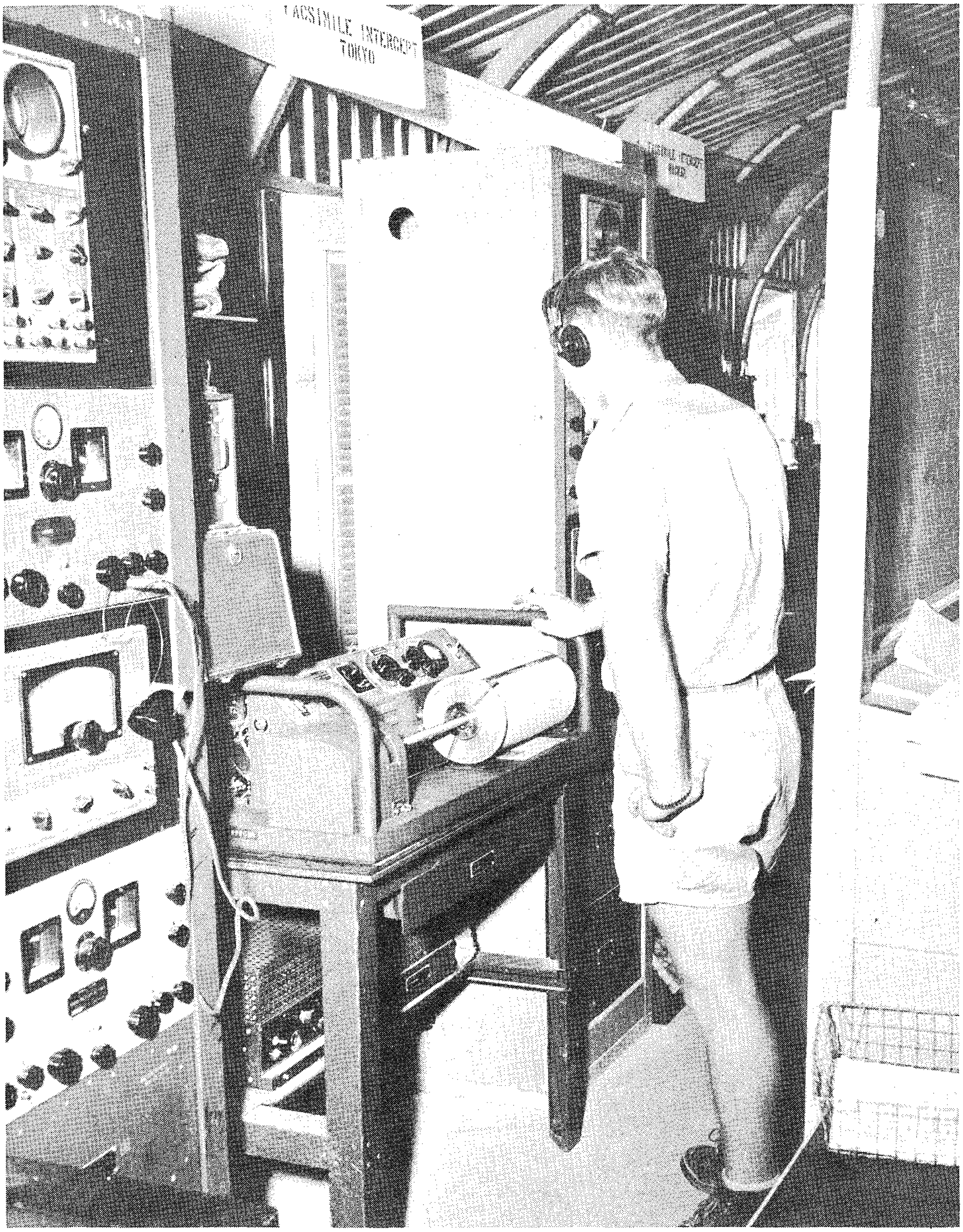

FIGURE 109. AACS Weather Intercept Facsimile Facilities, Eniwetok Island

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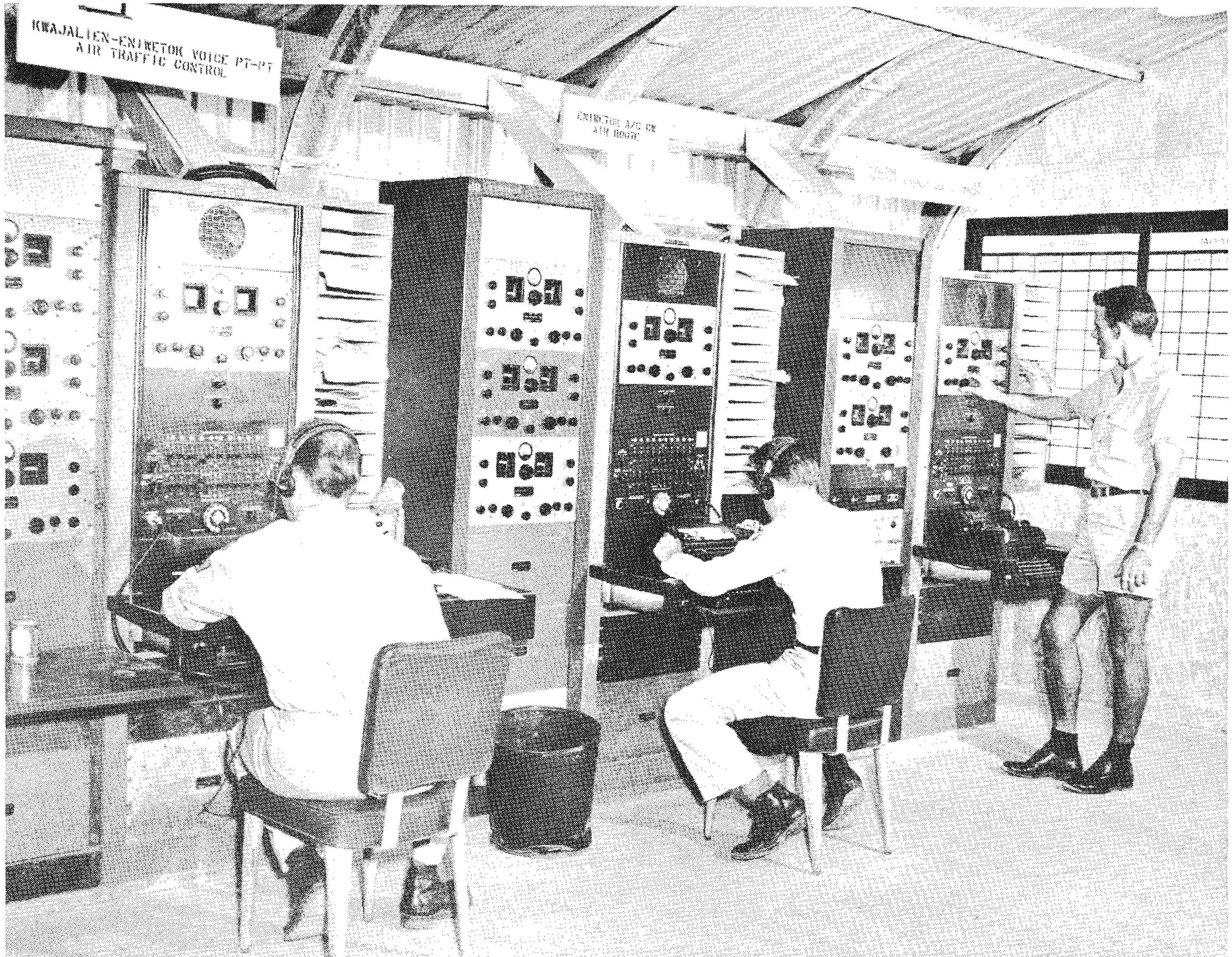

FIGURE 110. ATG 3.4 Radio Receiving Facilities, Eniwetok Island

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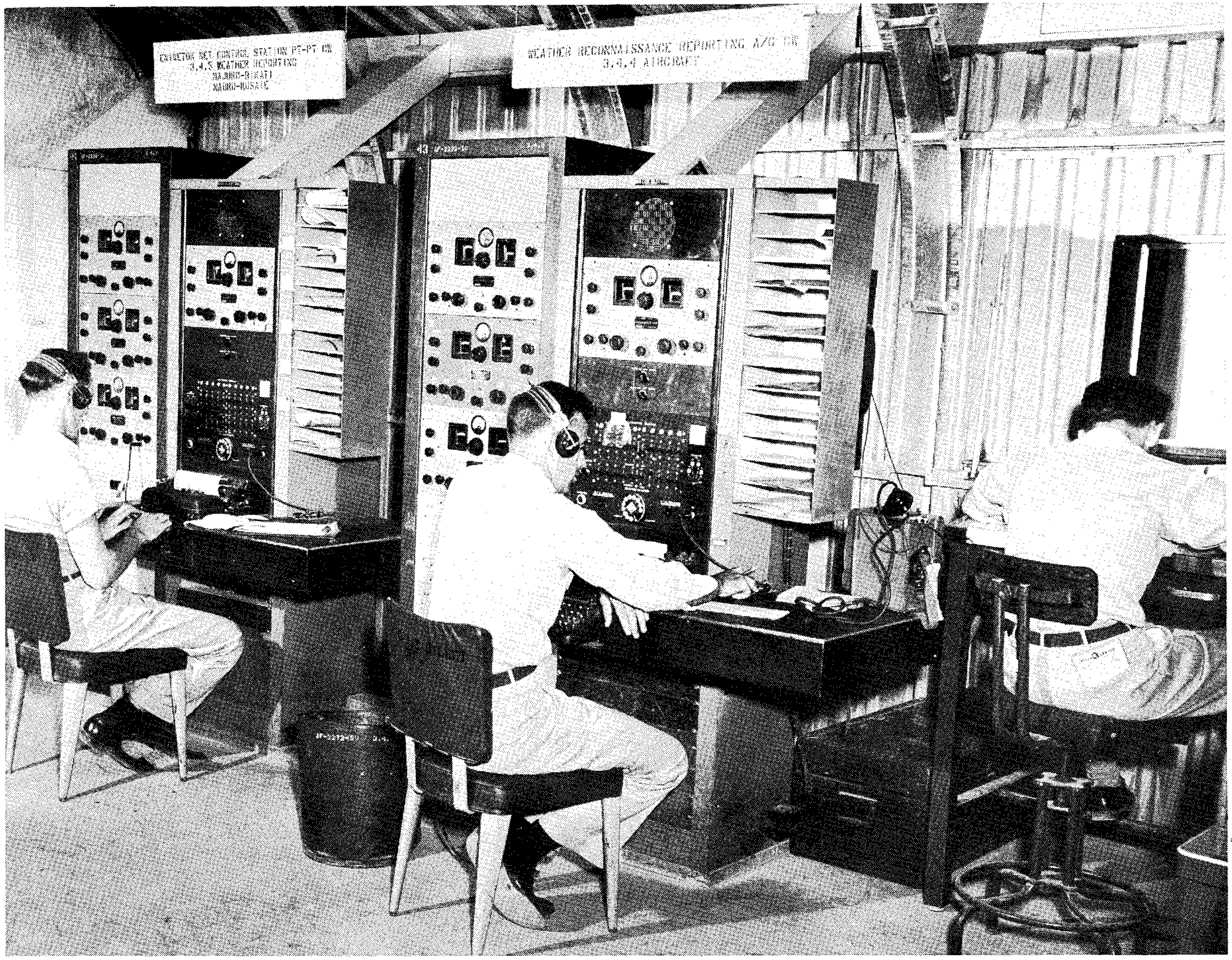

FIGURE 111. AACS Point to Point Weather Net and CW Weather Intercept Positions, Eniwetok Island.

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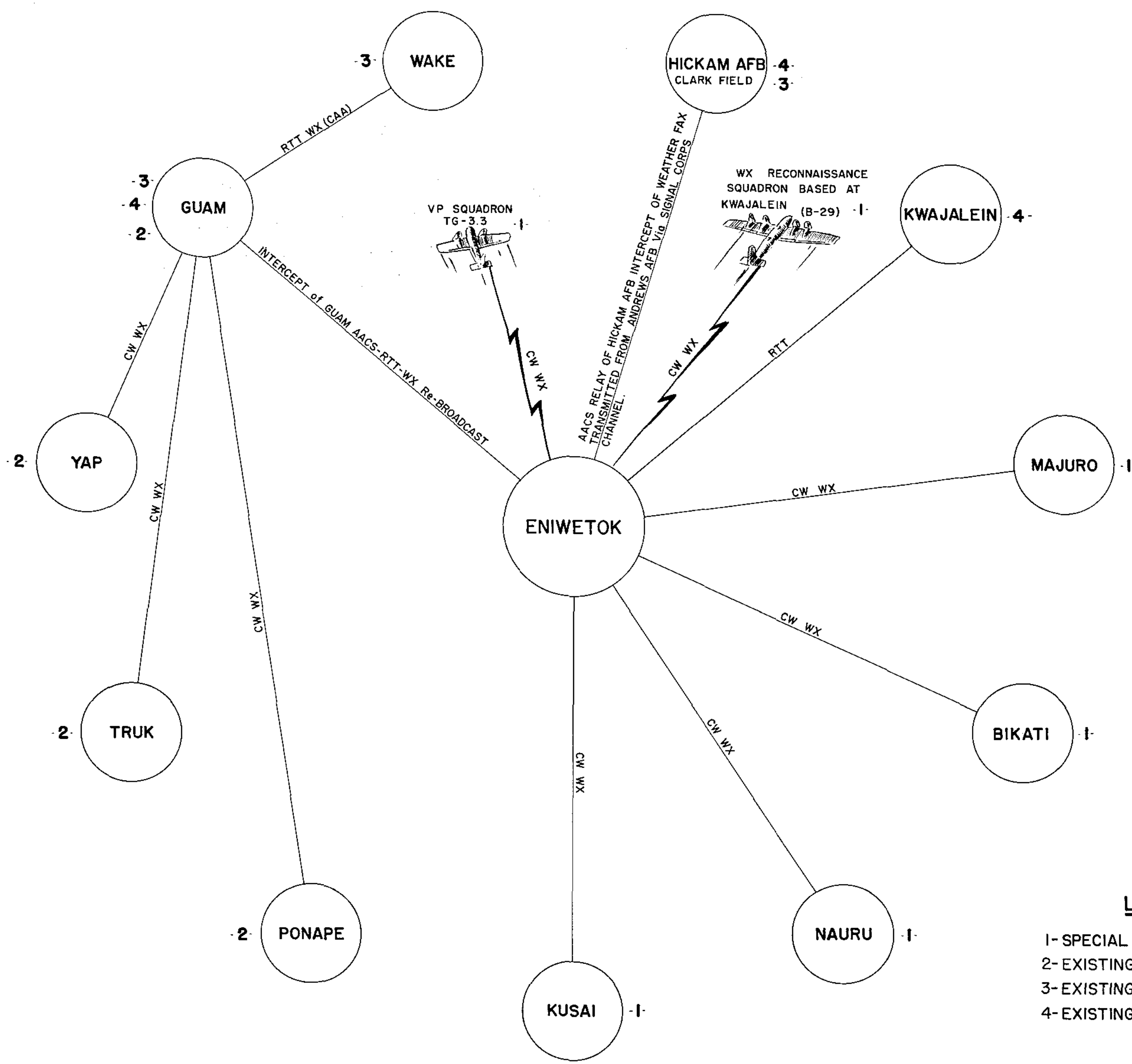
WEATHER CIRCUIT CENTERED ON ENIWETOK



LEGEND

1-SPECIAL JTF-3 WX STATIONS
2-EXISTING NAVY WX STATIONS
3-EXISTING CAA WX STATIONS
4-EXISTING AACS WX STATIONS

FIGURE 112

control of aircraft in the Eniwetok area. Types of traffic were:

Weather information.
Radio navigational information.
Vehicular control.
Inter-island liaison flight control.
Search and Rescue information.
Approach and landing instructions.

8.8.4 The installation as originally planned was designated to accommodate a traffic load of five hundred thousand groups per month. Lowest traffic volume was experienced during the month of January 1951. This traffic, listed in numbers of messages, fell into precedence groups as follows:

PRECEDENCE	SENT	RECEIVED
OP	589	247
P	107	96
Other	1113	1165
Total	1809	1508

8.8.5 February 1951 was the first month of full operational capability. Message traffic for this month appears as follows:

PRECEDENCE	SENT	RECEIVED
OP	992	798
P	205	240
Other	2248	2331
Total	3445	3369

8.8.6 April was the peak traffic month. Messages, totaling 23,114 for this month, were divided as follows:

PRECEDENCE	SENT	RECEIVED
OP	6697	3983
P	1547	2304
Other	3063	5538
Total	11307	11825

8.8.7 Average group count per message was found to be 56 in April. This average taken with regard to total message volume leads to a total of more than 1,200,000 groups for the month. The attached Traffic Analysis chart, Figure 113, graphically presents the volume variation over the operational period. Figure 114, summarizes the processing of this traffic in point of time.

8.8.8 There were 10,287 radio contacts from the Control Tower during the month of January, involving 780 landings and 777 takeoffs. January was the lightest month of Control Tower operation. Control Tower peaked in February with the expansion of Task Group on-site aircraft to a total of 17,800 radio contacts.

8.8.9 CW traffic varied from a low of 4,984 messages in the month of February 1951 through 5,223 for April to a peak of 3,041 for the first half of May 1951.

8.9 Traffic Volume

8.9.1 The actual volume of traffic, both incoming and outgoing, handled by the Communications Center of Commander Task Group 3.3 is shown on Chart 115. The message handling capacity of the communications Section was at no time exceeded; however, delays in the handling of encrypted messages did occur due to overclassification and the use of higher than warranted precedence. The peaks in traffic volume as shown on Figure 115, coincided in all cases with the increased activity of the Task Group in preparing for a particular shot. The increase in patrol planes on station just prior to the shot (D-day minus 5 days) resulted in an increase of approximately 400% in the number of position-weather reports transmitted to the Task Group Commander.

MONTHLY TRAFFIC

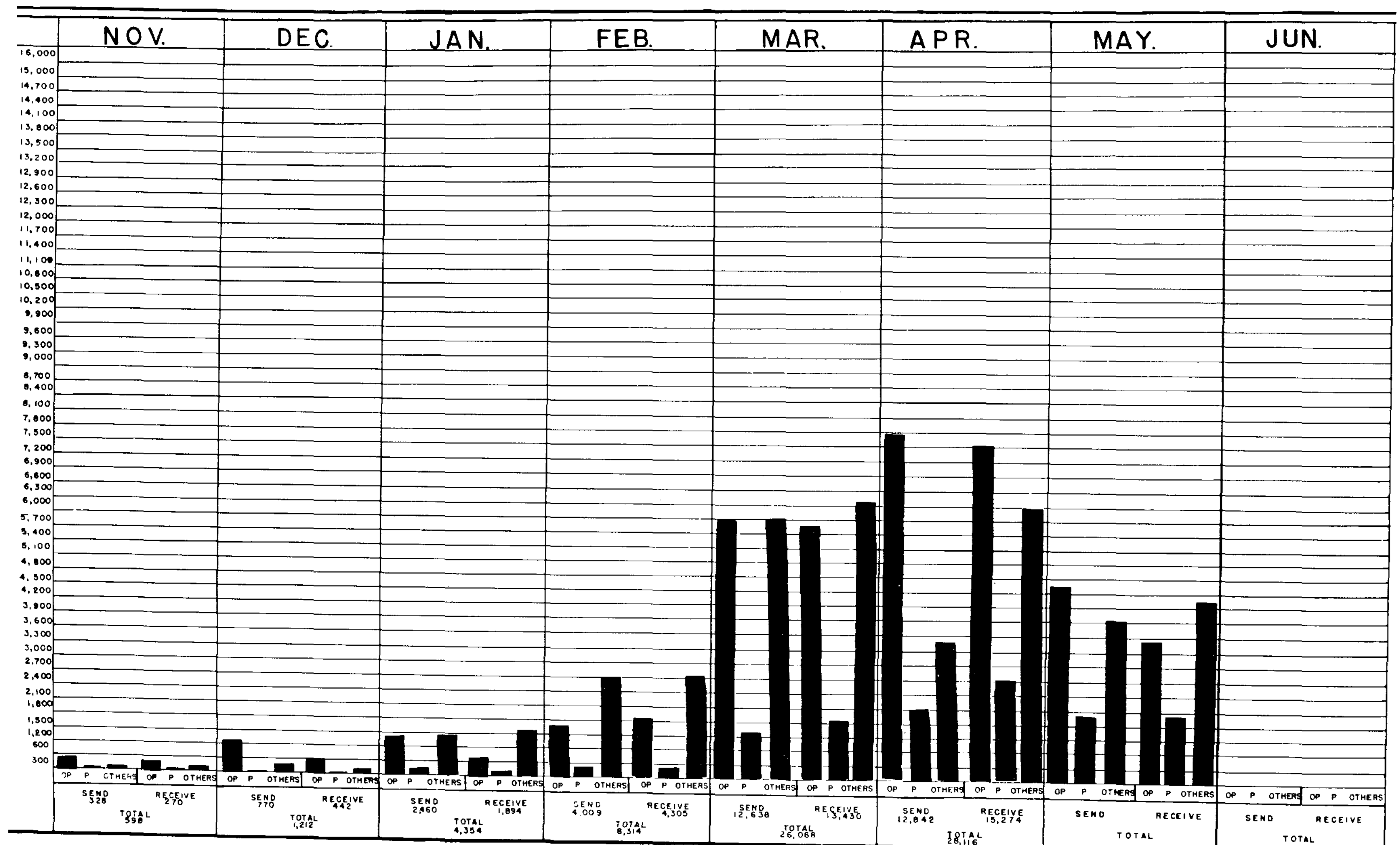


FIGURE 113. ATG 3.4 Message Traffic Data

MESSAGE HANDLING TIME
- CHART -

OUTGOING					
PRECEDENCE	TOTAL TIME FROM DTG TO TIME OF XMISSION	HANDLING TIME FROM AG TO RECEIPT BY 3.4.3	HANDLING TIME 3.4.3 TO 3.2 (CRYPTO)	TIME AT CRYPTO UNTIL RECEIVED BY 3.4.3	REHANDLING AT 3.4.3 UNTIL TRANSMISSION
OP	1 HR. 8 MIN	4 MIN	4 MIN	55 MIN	5 MIN
P	1 HR. 34 MIN	5 MIN	10 MIN	1 HR 13 MIN	6 MIN
R	2 HR 7 MIN	11 MIN	14 MIN	1 HR 22 MIN	20 MIN
NM	1 HR 58 MIN	16 MIN	15 MIN	1 HR 19 MIN	7 MIN
ALL	1 HR 41½ MIN	9 MIN	11 MIN	1 HR 12 MIN	9½ MIN

INCOMING					
PRECEDENCE	DTG UNTIL RECEIVED 3.4.3 (TRANSMIT TIME)	HANDLING TIME FROM 3.4.3 TO CRYPTO	TIME AT CRYPTO UNTIL RETURNED TO 3.4.3	TIME AT 3.4.3 UNTIL RECEIVED BY AG 3.4	TOTAL TIME FROM RECEIPT BY 3.4.3 UNTIL RECEIPT BY AG 3.4
OP	42 MIN	3 MIN	29 MIN	6 MIN	38 MIN
P	1 HR 2 MIN	7 MIN	44 MIN	13 MIN	1 HR 4 MIN
R	1 HR 19 MIN	4 MIN	1 HR 4 MIN	24 MIN	1 HR 32 MIN
NM	NONE	NONE	NONE	NONE	NONE
ALL	1 HR 1 MIN	5 MIN	46 MIN	15 MIN	1 HR 5 MIN

FIGURE 114. ATG 3.4 Message Handling Time Chart

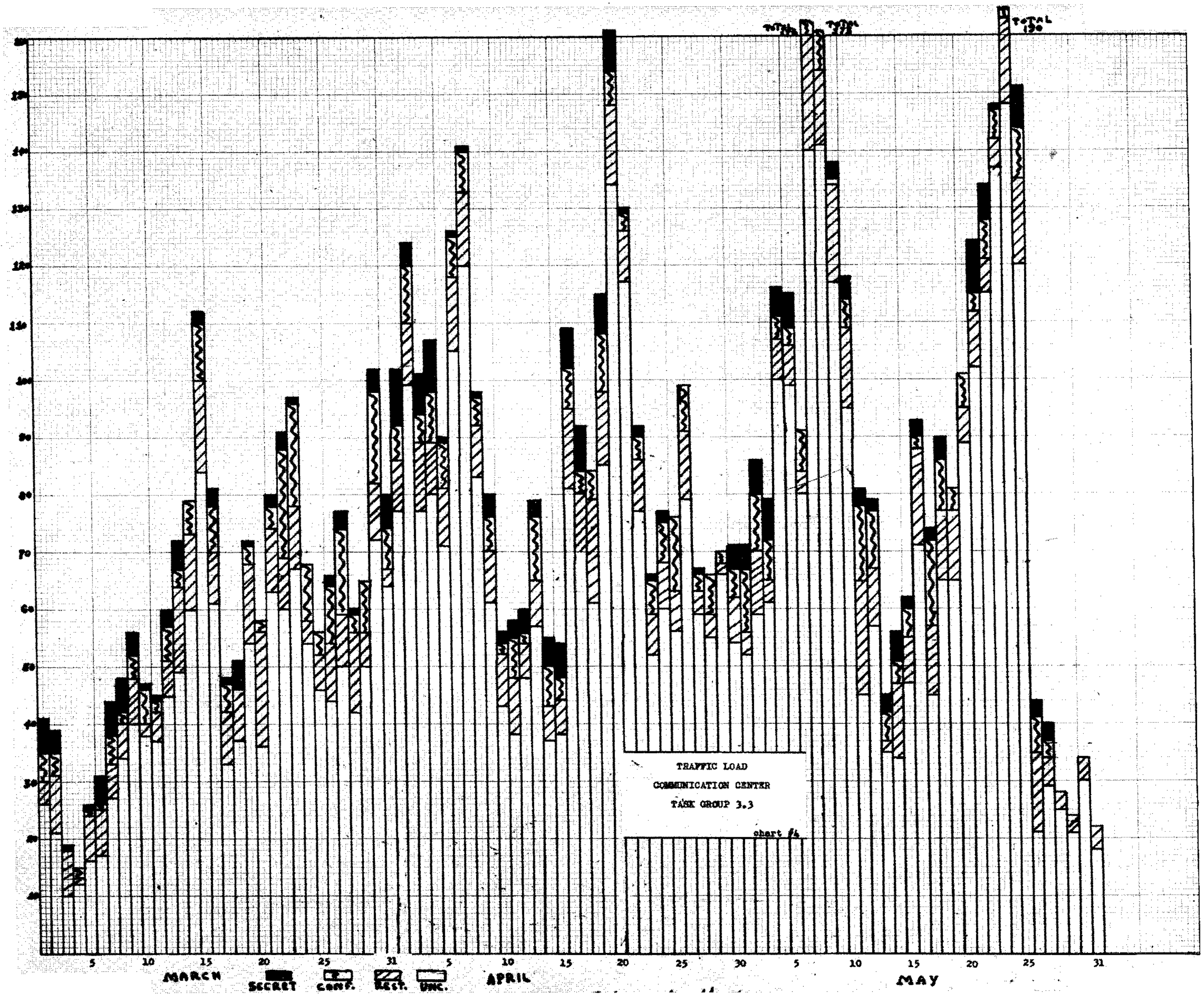


FIGURE 115. Message Traffic Volume TG 3.3 Communications Center

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Chapter IX

SPECIAL COMMUNICATIONS

9.1 General

9.1.1 In planning communications for a task force, considerable items of special electronic nature are easily overlooked by the signal officers. These items can be placed into several categories such as:

Public address systems
Special power supplies
Recording equipment including magnetic tape and wire recorders
Projection systems
Movie projectors
Hammond or other electric organs
Briefing microphones
Inter-communications systems
Special record players, having speeds of 33⅓, 45, and 78 RPM
Special Services radio transmitters and receivers

9.1.2 In the initial planning stages of an operation, many of these items are overlooked or are not considered as an absolute requirement by the various task group or task unit commanders. However, as the operation progresses it is essential that the equipment such as described above be employed.

9.2 Gates 250 Watt Transmitter

9.2.1 A 250 watt Gates Special Services AM Transmitter operating on a frequency of 1390 kcs was shipped to Eniwetok. This was installed and maintained by the 7127 AU Communications Detachment; however, it was operated by Special Services personnel.

9.2.2 This transmitter operated satisfactorily and gave no trouble during the operation. It had a coverage of approximately 200 miles, being fed by a doublet antenna. Reception was considered good for both voice and music. This station could have been used in connection with emergency evacuation had the need arisen. During shot time it was operated 24 hours a day and used as a homing beacon for the aircraft of the Air Task Group.

9.3 R–100 Radio Receiver

9.3.1 Approximately two hundred R–100 Special Services radio receivers were shipped and were issued by the Special Services Officer. These had to be maintained by the Signal organization. It is well to point out that in requisitioning these items that spare parts should be ordered by the requisitioning agency responsible for the equipment so that no burden is imposed upon other agencies responsible for the maintenance of the service equipment. Spare parts for the R–100 receiver are not stocked in any Signal Corps depots and consequently such parts such as tubes, capacitors, etc., which fail frequently in these receivers cannot be readily obtained. Therefore, a large supply of replacement parts should be kept on hand and requisitioned through the Special Services organization.

9.4 Hammond Electric Organ

9.4.1 This was installed in the chapel on Eniwetok Island. Although it had been in service for a considerable amount of time, the sounding board was found to be defective and had to be repaired. There was not sufficient personnel well versed in the required art of repair or making necessary alignment with this type of equipment. Also, since the tubes used in this organ were of the 45, 27 and 80 types, which are not in general production today, this organ is considered obsolete. For future operations it is suggested that a new type instrument replace this obsolete unit.

9.5 Inter-Communications System

9.5.1 Little difficulty was experienced with the 12-channel LS–124 inter-communications system. These were all wired to separate ter-

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minal boards and were used very successfully. However, there were 3 different types of systems in use during the operation and it is suggested that for maintenance and general logistic purposes, one standard type be procured, or that the LS–124's be augmented for any additional usage which may be deemed necessary by the operating personnel.

9.6 Movie Projectors

9.6.1 Considerable difficulty was experienced with the bulb type movie projectors which were originally issued for use at Eniwetok. This difficulty consisted of the failure of the bulk projector to throw enough light on the screen. This was due to the fact that the theaters were open air type with a throw of 100 plus feet. This was considerably longer than that normally used for the bulb type projectors which were issued. Consequently, on a clear night when the moon was at its brightest, or if a rain caused poor visibility, the image of the screen was blurred or faint. However, with the arrival of the arc type projectors from USARPAC this difficulty was eliminated in contrast to the poor visibility shown by the movie projectors used on Parry Island.

9.7 Public Address Systems

9.7.1 Special requirements arose from time to time for special public address installations to be used in connection with briefings of VIPs and other task force personnel. This was complicated due to the fact that no battery-type power supplies were available and consequently these had to be built since a large percentage of these equipments were installed on jeeps, boats, vehicles, and DUKW's. A special installation wherein two DUKW's had to go to the shot islands for briefing of VIP personnel in which the lecturer or guide spoke from one DUKW via radio to the other DUKW and the output of the receiver was fed into a public address system with two speakers which were mounted on the other DUKW so that all parties could hear what was going on.

9.8 Recorders

9.8.1 Continual requirements were placed on the signal section relative to recordings of various speeches, interviews, etc. Tape recorders were available for this; however, there was not a sufficient quantity of these.

9.9 Recommendations

9.9.1 Items which are quite frequently overlooked in planning for general communications are herewith recommended for inclusion to meet special needs:

a. Four small portable power units, PE–75 or equivalent.

b. Six variable voltage power supplies; 110 v AC input to provide variable filament output voltage from 1.5 to 12 volts DC and variable plate supply from 180 to 380 volts DC.

c. Six, 6 or 12 volt vibrator type power supplies with variable output of 180 to 350 v DC to be used for mobile installation of radio or public address system equipment.

d. Five public address systems, AN/TIQ–2 or equivalent.

e. Ten 12 position inter-communication sets plus cable and terminals.

f. Two tape recorders with ½ hour minimum running time for speeds of 15 and 7 FPS capable of operation from 110 v AC, or battery operated power supplies.

g. Five Special Services phonographs equipped for all speeds.

h. Spare parts and equipment for the repair and maintenance of such items as Hammond organs, photoelectric cells, projection equipment, photographic supplies and coaxial cable should be included.

i. Approximately 25 electronic megaphones should be procured for an operation such as this. These could have been used advantageously in lieu of the radio sets issued to working parties on the shot islands, for lighterage use by the port transportation company and for emergency evacuation to give orders or instructions to the various small groups congregated in boats or to large contingents of personnel awaiting orders for embarkation or debarkation. These megaphones are lightweight and are operated by batteries and very little maintenance is required.

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Chapter X

COMMUNICATIONS SUPPLY

10.1 Supply General

10.1.1 The AEC through its contractor Holmes and Narver provided all telephone switchboards, inter-island and buoy cables, local cables on all islands except Eniwetok. In general the contractor supplied all telephone equipment except that required to rehabilitate the outside telephone plant on Eniwetok Island. The equipment ordered by the contractor was obtained commercially and in most cases delivered on site without reference to Hq, JTF-3.

10.1.2 Upon activation of Hqs, JTF-3, the construction schedule of the AEC contractor, assisted by the 79th Engineer Brigade, was such that normal supply procedure by Task Group Communications Officers involving 120 days' delay, could not be adopted. Supporting inter-island and long haul communications were required and it was necessary for the J-5 Division Hq, JTF-3 to make communication systems plans prior to assignment of Task Group Communications Officers. Since planning and engineering of JTF-3 communications was done in the J-5 Division and it was therefore decided that the supply action to obtain the necessary material and equipment should be undertaken by the J-5 Division. Communications equipment provided by the contractor for inter-island and boat pool communications during the construction phase proved inadequate and it was necessary to arrange with the Chief Signal Officer for air shipment of 17 radio sets SCR-608 in March of 1950 to meet this requirement.

10.1.3 The J-5 Division, Hq, JTF-3, initiated requisitions for all major items of fixed plant and tactical communications equipment required by Hq, JTF-3, and TG 3.2, including equipment for the rehabilitation of the Eniwetok Island telephone plant, and for tactical communication equipment required by Task Group 3.1. These requisitions were submitted in letter form direct to the Chief Signal Officer and included marking and shipping instructions and a request that all equipment be moisture and fungus proofed, tropical packed for overseas shipment and supplied with a one-year supply of maintenance parts.

10.1.4 Equipment required by TG 3.1 for the establishment of a 10 KW radio teletype station at Los Alamos was provided by the Chief Signal Officer at the request of Hq, JTF-3. The AEC agreed to purchase this equipment if its retention was desired upon completion of Operation GREENHOUSE.

10.1.5 The Chief Signal Officer through the Signal Corps Engineering Laboratories contracted with the Stancil Hoffman Company, Hollywood, California, for the manufacture of special portable and fixed multi-channel recording equipment required for installation in the monitor room of the receiver building and for use at remote stations in connection with Scientific Program 8.3B. Production delays necessitated airlift of this equipment totaling approximately ten tons, to Eniwetok in December of 1950. No other recording equipment was obtained for the operation. The Stancil-Hoffman Recorders were utilized for communications security monitoring in addition to the primary use in the scientific program.

10.1.6 Cryptographic devices and documents required in the forward area were supplied by Army Security Agency, Hawaii. One-time tapes were provided and distributed by the Army Security Agency, Washington, D. C., and by the Communications Division of the Atomic Energy Commission as requested by Hq, JTF-3. (See Section VI, Cryptography.)

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10.1.7 Normal logistic support for Operation GREENHOUSE was through the Overseas Supply Division, SFPOE, which required 120 days elapsed time between date requisitions were submitted and supplies were received. The Hawaiian Signal Depot honored emergency requisitions (submitted by radio and confirmed by written requisitions) for shipment of equipment and supplies required in a lesser time or in an emergency.

10.1.8 A Signal Warehouse was provided on Eniwetok by TG 3.2 for the storage and issue of communications equipment for all elements of the Task Force with the exception of those items peculiar to the Air Force, Navy and Scientific Task Groups. The requisitioning of fixed plant items and maintenance supplies was a responsibility of Task Group Signal Officers.

10.2 Task Group 3.1 Communiction Supply

10.2.1 Signal Corps communications equipment for Task Group 3.1 was obtained from TG 3.2 by requisition through the TG 3.1 Supply Section which received the equipment and issued it to the Communications Officers, in turn, issued on hand receipt to the using organization. Holmes and Narver who was responsible for the installation and maintenance of TG 3.1 communications equipment, held on memorandum receipt from TG 3.2 the radio equipment required for the operation of the boat pool.

10.2.2 Supply discipline and control among communications operating and maintenance forces of TG 3.1 was poor. During the course of the operation needs for maintenance was abnormally high and TG 3.1 supply and maintenance personnel did not anticipate or requisition maintenance parts from TG 3.2 until stocks were depleted and it became necessary in some cases to exchange sets or cannibalize parts from equipment held by TG 3.1. Adequate records were not maintained of such transactions, resulting in some confusion in accounting for major items and parts during roll-up and return of equipment to TG 3.2. The H&N maintenance section was not advised as to the non-expendability of component parts and maintenance items for Signal Corps radio sets. This resulted in junking non-expendable parts such as speakers, vibrators, antenna mast, etc., removed as defective during maintenance of equipment or when they were damaged in use.

10.3 Task Group 3.2 Communications Supply

10.3.1 The Signal Supply Section of TG 3.2 consisting of one supply officer and three enlisted men, departed the ZI for the forward area with the first element of the 7127th AU Communications Detachment on 4 March 1950. This section was understrength during the initial construction phase. This condition remained until June 1950 at which time Signal Supply was brought up to a compliment of one officer, MOS 4400, and six enlisted men with supply MOS's.

10.3.2 As prescribed by JTF–3 the Island Central Depot Supply organization consisted of one accountable officer. Each technical service was represented by one responsible supply officer. The Signal Supply Officer was an assistant Supply Officer to the Island Central Depot Supply Accountable Officer.

10.3.3 While en route, the stock records cards for Signal Property requisitioned by J–5 Division (Communications Section) JTF–3 were established from advance information in the hands of the Signal Supply Officer.

10.3.4 Shortly after arrival at Eniwetok, all Signal property under Army property account (AP 304) assigned to Garrison Force was transferred to account AP 330 assigned to TG 3.2. Property transferred consisted of Ground Force and Air Force Signal property. At that time no Air Force property account had been established. In the original plan, Signal Property Records were integrated with property records of other technical services. This system was unsatisfactory and Signal records were separated to alleviate difficulties. Signal Supply records and files were maintained as follows:

10.3.4.1 Stock Record Cards, Form WD AGO 421, totaled 6,414 in active use.

10.3.4.2 Voucher register.

10.3.4.3 Voucher File, containing one hundred vouchers per folder, total vouchers processed: (1970).

10.3.4.4 Memorandum Receipt Jacket Files, Total (86).

10.3.4.5 Cost Accounting File, included a priced copy of all processed vouchers. A copy of which was forwarded to the Comptroller, TG 3.2, weekly.

10.3.4.6 Major Equipment Status Chart was currently maintained and supplied graphic information pertaining to all not-expendable Signal items of AP 330 by class, stock number, total quantity held in suspense for special project and the quantity due in to the station. This included details to property out to using sections or units. Audit of Army Property Account (AP 330), which included Signal property was conducted on 27 October 1950. The auditor's report rated the Signal portion of the Account excellent.

10.3.5 Two categories of M/R account holders were established. One authorized to draw property from any of the established technical services. The other authorized to draw Signal equipment only, for the operating sections and one property on hand receipt from the sections involved. The Officer-in-charge of each operating section was authorized to draw Signal property on M/R direct from the Signal Property Station. Issues other than M/R were made from existing stocks to TO/E units as TO/E property when such items of TO/E property became unserviceable, fair-wear-and-tear (FWT) and turned in for replacement. The following indicates the issuing totals:

Issues	(1028)
Total line items involved	(3591)

10.3.6 Following is a breakdown of requisitions submitted by the Signal Property Officer, TG 3.2, and of incoming shipments including material requisitioned by the J-5 Division, Hq, JTF-3:

Requisitions to USARPAC	(90)
Total line items involved	(616)
Incoming shipments from ZI	(422)
Incoming shipments from USARPAC	(182)

10.3.7 Shipments of Signal Property from the forward area to the ZI and to USARPAC consisted of property declared excess and property released for major repair and return. In a number of instances this was property remaining in the forward area from SANDSTONE or provided for use by Garrison Forces between SANDSTONE and GREENHOUSE. It was considered highly desirable to dispose of all property excess to JTF-3 needs at the earliest date to relieve shipping congestion during the roll-up phase. Changes in communications requirements and examinations of property on hand in September of 1950 and January of 1951 were the basis for declaring Signal property excess. The following indicates shipping data from the forward area:

Shipments to the ZI	(22)
Quantity in pounds	(319,767)
Quantity in cube	(15,684)
Total line items involved	(578)

10.3.8 Depot maintenance included cleaning and overall check, as to serviceability, prior to return of the equipment to stock. The complexity of Signal equipment and detrimental climatic conditions necessitated the turn-in of complete items as operationally unserviceable. The following indicates turn-in data:

Turn-ins	(316)
Total line items involved	(962)

10.4 TG 3.3 Communication Supply

10.4.1 At the time the USS CURTISS was designated as the Flag Ship of TG 3.3 and as a weapons assembly ship for TG 3.1 it was committed to support combat in the Far East and was not available for inspection or modification prior to joining the Task Force in January of 1951. Due to the delayed activation of TG 3.3, it was necessary for the J-5 Division to plan communications and requisition equipment required by the Navy Task Group over and above that which was normally installed aboard participating vessels. This equipment, consisting of communications center and VHF radio back-up facilities, was provided for installation aboard the USS CURTISS at the San Francisco Naval Shipyard, in January of 1951.

10.5 TG 3.4 Communications Supply

10.5.1 Air Base Communications Facilities.

10.5.1.1 Relationship between the Task Group Deputy for Materiel and the Deputy for Communications was at all times one of

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close coordination and cooperation. Initially, the Deputy for Communications also performed the duties of Deputy Chief of Staff, Materiel. Through special arrangements with the Air Materiel Command, requisitions for supplies in the Task Group were submitted directly from the Deputy Chief of Staff, Materiel, to special GREENHOUSE representatives at Headquarters, Air Materiel Command. Liaison Officers were established at Sacramento Air Materiel Area, the air and water ports of embarkation, and at Hickam Air Force Base. These officers were principally concerned with the shipment of supplies and were of inestimable value in coordinating the movement of electronics equipment.

10.5.1.2 The rate at which communications supplies were shipped to the forward area is broadly presented in the chart of Figure 116. It will be noted that supply shipments mounted rapidly from July, when the Korean crisis was placing heavy loads on transportation, to a rapid rise in August when backlogs at the ports were cleared.

10.5.1.3 In all, approximately seventy types of complete sets of electronics equipment were required in the forward area for Task Group operations. Line items of communications and electronics equipment received at the Eniwetok Base Supply were as follows:

Class	Line Items	Cubic Feet	Weight Lbs.
16 NISL	87	150	1,310
16 A	290	900	7,200
16 B	42	540	4,860
16 C	100	700	6,300
16 E	4,119	1,550	13,590
16 F	209	40	300
16 H	104	50	450
16 J	101	75	1,100
16 K	77	125	1,125
Signal	3,220	9,951	173,661
Total	8,349	14,081	209,896

10.5.1.4 In all, the supply agencies processed 27 Air Force Supply Directives on electronics equipment, averaging 500 line items per directive. Stock records maintained at Eniwetok also included material at Kwajalein. This permitted easy reference to supply status at either site.

10.5.1.5 In general, material processing and delivery was good. An average time of processing an AFSD was found to be 120 days. Equipment arrived in good condition and, except for a few specific types of equipment, in the quantities desired. Special attention had to be given the acquisition of a suitable search radar in view of the current nation-wide air defense expansion. VHF radio land-line back-up equipment, the AN/TRC–1 was not installed because Hq, JTF–3, denied its use since adequate land-line back-up was available. This had no ill effects on the overall mission. Facsimile converter, CV–2/TX, was another item in short supply. Temporary loan of this equipment from Zone of Interior installations permitted the operation of radio facsimile weather intercept. Another instance of special consideration was the temporary assignment of one Air Operations Center Officer to the Port of Embarkation to monitor the receiving and shipping of supplies associated with the AOC.

10.5.1.6 The one general class of material which was cause for greatest alarm was that of radio crystals. Procurement of radio crystals characteristically presented logistical problems which are centered about the unavoidable necessity for delay. Crystal requirements are determined by two factors: equipment types and operational frequencies. Preparation of crystal requisitions must therefore await final approval of the frequency plan and the assurance that certain types of equipment will be available on site for specific circuit employment. Notwithstanding this, as a precautionary measure, crystal requisitions had been prepared and presented Air Materiel Command in October of 1950, based upon tentative frequency allocations. Final crystal requisitions could not be prepared until December of the same year. As a consequence, full supplies of radio crystals *never* became available via normal supply means. In April 1951, after two of the four test exercises had been completed, a crystal supply study was conducted which disclosed that only 60% of crystals requisitioned had arrived on site. The fact that communications were operative resulted from obtaining crystals from other sources which included a limited crystal-grinding facility in TG 3.2 and other communications operating and supply organi-

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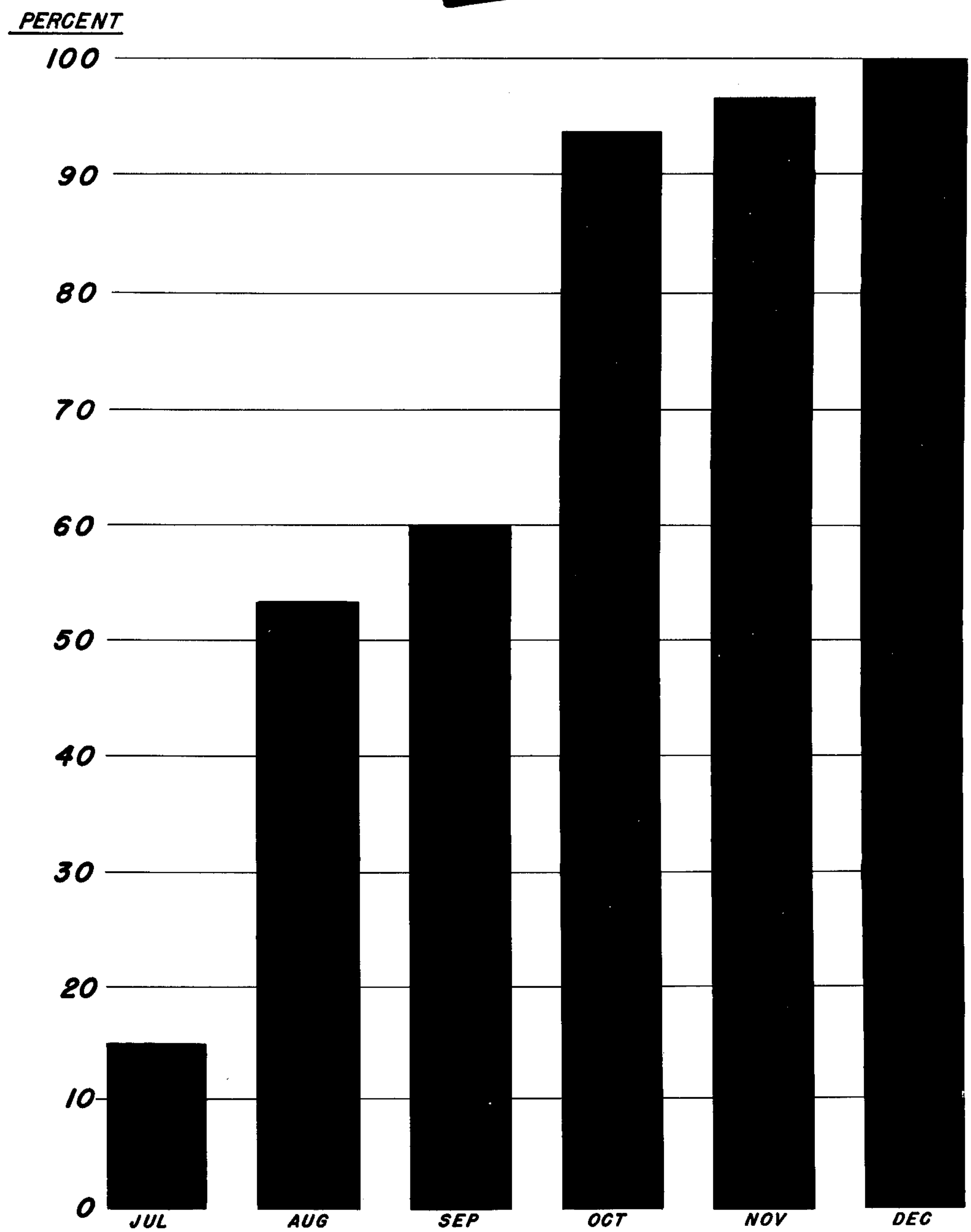

FIGURE 116. Schedule of ATG 3.4 Communications Supply Shipments to Forward Area

zations in the Pacific area. Much difficulty pertaining to crystal supply could be eliminated by piecemeal requisitions as specific frequencies and equipment types became assured and by the provision of an adequate crystal-grinding facility at the operational site.

10.5.1.7 The most critical of all supply problems was that of the aircraft scientific instrumentation and associated electronic gear. The details of this problem are taken up in the discussion of the experimental aircraft unit and will not be explored in this section. It is important to state, however, that the procurement and installation of aircraft instrumentation warrant the special attention of the Deputy Chief of Staff, Communications and Electronics. In this project the communications officer maintained constant vigilance over the progress of instrumentation. Personal contact with senior officers of Air Materiel Command, the procurement of installation teams from the Middletown Air Materiel

area, and continuous correlation of effort with the electronics officer of the experimental aircraft unit, materially assisted the ultimate success of the project. It is not sufficient merely to devise a workable plan and then rely on the proper authorities for appropriate personnel, equipment, and other logistic support to realize a successful mission. A great deal of follow-up is necessary in the surveillance of processing, the tracing of supply flow, the avoidance of small errors, and the determination of suitable substitutes from available stocks.

10.5.1.8 Due to the voluminous amount of highly technical equipment utilized on a project of this type, extreme care is continuously required to assure that proper equipment and maintenance spares are requisitioned. To further complicate this situation, some equipment used was only in the development stages and standard nomenclatures, stock numbers, etc., had not been published. As a result, undue delays were experienced in the expeditious procurement of vital parts to meet operational deadlines. A small communications supply section in the Deputy Chief of Staff, Materiel, devoted to the single function of monitoring the supply situation, would have contributed greatly to the minimization of supply difficulties.

10.5.2 Experimental Aircraft TU 3.4.2.

10.5.2.1 The Electronics Section was responsible for a variety of electronic installations in seventeen QB-17, fifteen DB-17, five QT-33, five DT-33, one Radiac B-17, two B-50D, and one XB-47 aircraft. Additionally, supporting ground installations were required for radio and radar remote control, instrumentation, and maintenance of all electronic equipment. The bulk of equipment installed in aircraft was transported to the forward area in aircraft concerned.

10.5.2.2 Spare electronic components, tools, five AN/MSQ-1 Radars with M-7 Power Units, three AN/MRW-3 radio control ground stations with PE-143 Power Units, and five thirty foot van type trailers for maintenance of remote control equipment and operation of instrumentation equipment were transported by highway from the training base at Eglin Air Force Base, Florida, to the Air Materiel Depot at Mobile, Alabama. At Mobile, the equipment was packed and prepared for overseas shipment by surface transportation. This shipment, accompanied by one officer and five airmen of this unit, left Mobile by rail on 5 January 1951. It totaled five hundred eighty tons and arrived at the Eniwetok test site about 1 March 1951.

10.5.2.3 Thirty-five tons of sensitive electronic equipment was shipped by air from Eglin Air Force Base, Florida to Eniwetok to preclude possible surface transportation handling damage. This shipment was delivered at Eniwetok in three lots on 20 December 1950, 11 January 1951, and 20 January 1951.

10.5.2.4 Approximately twenty thousand pounds of electronic equipment, mainly for USAF blast and gust instrumentation program, was delivered to Travis Air Force Base by the Air Materiel Command. This was shipped to the forward area, the last of it arriving on 15 March 1951.

10.5.2.5 Approximately twenty thousand pounds of electronic spare parts were shipped by surface as the Air Materiel Command filled supply requirements planned as early as February 1950 and requisitioned throughout the training period. Thirty PE-143 Power Units and three mobile power units for searchlights which were to have been supplied under this procedure were not received on schedule. This failure resulted in necessity for air shipment of twenty PE-143 units from Eglin Air Force Base. Three searchlight power plants were shipped by air from USAF stock in the Zone of Interior and arrived on site 6 March 1951. As a result, preparation of remote control equipment in aircraft and initiation of night flying training of remote control crews was delayed approximately three weeks.

10.5.2.6 The greatest problems in the logistic line concerned obtaining timely delivery of new equipment from manufacturers. Much of the telemetering and recording equipment to be used in the USAF Blast and Gust Instrumentation Program was delivered directly to Eniwetok test site although early planning contemplated delivery of this equipment to the training bases many months earlier. Late deliveries of equipment made operation of in-

strumentation equipment extremely difficult and in some cases impossible.

10.5.2.7 Receipt, storage, and recording of equipment at the Eniwetok test site was orderly and efficient. All supplies and equipment except those which were installed in project aircraft and those which accompanied the troop movement were processed through the Eniwetok base supply. The Task Unit 3.4.2 electronics supply officer accepted memorandum receipt responsibility for all electronic equipment and supplies consigned to the unit. Floor space eighty by forty feet in a quonset type hut was utilized by electronics supply for processing, handling, and storage of equipment. This space was adequate.

10.5.2.8 George Shot completed the requirement for participation of aircraft in the USAF blast and gust program. In the two weeks following this mission three hundred fifty tons of equipment required in support of that program were prepared and shipped to the Zone of Interior by surface transportation. This shipment included the five AN/MSQ-1 Radars with their power units, four thirty foot van type trailers and other instrumentation and test equipment. At the direction of the Joint Task Force Property Disposition Board, that equipment which was specifically instrumentation such as telemetering, recording, calibration, and scientific supporting equipment was shipped to Wright-Patterson Air Force Base. This shipment was accompanied by one officer and five airmen. Other equipment was shipped to Eglin Air Force Base in anticipation of preparation for future drone operation requirements. Also, five QB-17, two DB-17, one Radiac B-17, two B-50D, and one XB-47 aircraft were flown to the Zone of Interior.

10.5.2.9 To meet future drone operation requirements, it was necessary to airlift twenty thousand pounds of equipment from Eniwetok to Eglin Air Force Base upon completion of Project GREENHOUSE Operations. The remaining supplies and equipment were prepared for shipment and turned over to the Eniwetok Base Supply for shipment to Eglin Air Force Base subsequent to departure of personnel of this task unit.

10.5.2.10 Significant points worthy of consideration in logistic planning for any similar operation in the future are:

10.5.2.10.1 Many unusual difficulties and requirements for airlift will be encountered when large quantities of new equipment are scheduled for delivery from manufacturers in the final months prior to overseas movement. Late delivery of equipment from manufacturers was the rule rather than the exception during equipment delivery for this operation.

10.5.2.10.2 An infallible system of supply action follow-up of essential items are necessary to assure timely availability of critical equipment and supplies requisitioned through normal supply channels for direct shipment to the forward area.

10.5.2.10.3 When new or untried equipment is employed, some parts for which there are no replacements available are likely to fail. Direct contact with the manufacturer or with the USAF development laboratory then becomes the only means of securing expeditious supply action.

10.6 Conclusions and Recommendations

10.6.1 The services were in most cases very cooperative in providing communications equipment required in support of Operation GREENHOUSE. The chief of Naval Operations on several occasions insisted on reimbursement with Task Force funds which was contrary to the JCS Directive.

10.6.2 Experience gained in Operation GREENHOUSE reaffirmed the necessity for early planning and submission of requisitions well in advance of required date whenever possible to allow equipment and supplies to arrive on site when required by installations and operating personnel. The importance of proper shipping and marking instructions cannot be over emphasized. This not only prevents delays and losses in shipment but assists the receiving supply activity in the identification and expeditious delivery to using personnel. Task Group Communications Officers should requisition supplies thru normal supply channels whenever possible rather than submit requirements to Task Force headquarters for supply action as was done in a number of instances. The Signal Officer of each Task

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Group should examine also the TBA and/or TE of each participating unit to determine adequacy of organizational communications equipment. TE's including only one sound powered telephone and radio sets that would not net were encountered by the Army Task Group of JTF–3. When requisitioning radio sets, power supplies etc., the voltage must be specified otherwise 12 volt power supplies are normally furnished. Microphones, antenna masts and base sections, and keys are not normally furnished with basic radio sets and should be requisitioned separately.

10.6.3 Due to the complexity of problems arising with a Joint Operation it is necessary that personnel be well experienced in supply procedure. The first contingent should include full strength Signal Supply Section.

10.6.4 Signal supply catalogs and publications were not available during the initial phase of the operation making proper requisitioning difficult. In many cases the Signal Supply Section in the forward area was not furnished an information copy of requisitions placed by JTF–3 in the rear area causing confusion in handling, storing and issuing the property to authorized sections or units.

10.6.5 A table of equipment listing non-expendable items of signal corps equipment used by the various Task Groups during Operation GREENHOUSE was submitted to the D/A for approval to be retained at Eniwetok for use in subsequent operations. This list, Appendix III, also included some items not used during Operation GREENHOUSE but recommended for use during subsequent operations. Additional items not included on the above reference list, indicated below and quite frequently overlooked in planning general communications are recommended for inclusion in future tests to meet special unforeseen demands:

10.6.5.1 Four (4) each small portable power units 110 volt AC, 1000 Watt capacity.

10.6.5.2 Six (6) each variable voltage power supplies; 110 volt AC input to provide variable filament output voltage from 1.5 to 12 volts DC and variable plate supply from 180 to 380 volts DC.

10.6.5.3 Six (6) each 6 or 12 volt vibrator type power supplies with variable output of 180 to 350 volts DC to be used for mobile installation of radio or public address equipment.

10.6.5.4 Five (5) each public address systems, AN/TIQ–2 or equivalent.

10.6.5.5 Ten (10) each 12 position intercomm plus cable and terminals.

10.6.5.6 Six (6) each tape recorders with ½ hour minimum running time for speeds of 15 and 7 FPS capable of operation from 110 volt AC, or battery operated power supplies.

10.6.5.7 Spare parts and equipment for the repair and maintenance of such items as Hammond organs, photo cells, projection equipment, photographic supplies and coaxial cable should be included.

10.6.5.8 The K–44 telephone construction trunk used by TG 3.2 during Operation GREENHOUSE is in poor condition and should be replaced prior to the next operation.

10.6.5.9 A forklift for use in the Signal Warehouse is a must. A suitable type is Truck, forklift, gasoline 3,500 pounds, (Clark, Plane loader). Other organizations are using identical equipment at Eniwetok thereby simplifying supply and maintenance.

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Chapter XI

MAINTENANCE

11.1 To properly maintain equipment in an operation similar to GREENHOUSE, basic maintenance policies and procedures had to be followed. Maintenance personnel were allocated to all operating sections, the intention being that each section would provide its own maintenance on the spot as far as practical, with wire teams maintaining all antenna poles, guys and outside telephone plant.

11.2 Task Group 3.2 operated a communications installation and Maintenance shop on Eniwetok Island for the maintenance of Signal Corps equipment in use by Hqs, JTF–3, and subordinate Task Groups. A secondary mission of this repair facility was the maintenance of special service radio transmitting and receiving equipment. Holmes and Narver operated a radio repair shop on Parry Island for the maintenance of tactical radio sets and special electronic equipment used by the scientific task group. Maintenance facilities were integral to the various communications facilities of TG 3.3 and TG 3.4.

11.3 Maintenance of the telephone system on Parry and islands to the north and the inter-island and buoy cable system was performed by civilian employees of Holmes and Narver. Adequate maintenance supplies were available, however, Task Group 3.2 was called upon to furnish cable splicers on loan to the contractor for extended periods of time. There was no damage to telephone plant or cable facilities resulting from weapons test however, submarine cables between Sites E and Q and between Site D and the cable buoy were damaged by ships anchors. The cable between Sites C and M was damaged by a tractor and the buoy cable from Parry Island became defective shortly after installation and had to be replaced. The underground telephone lines installed on shot islands required constant replacement with field wire due to trenching and grading activities of construction forces.

11.4 Holmes and Narver operated a repair shop on Parry Island for the maintenance of tactical radio sets and special electronic equipment used by the Scientific Task Group. Civilian repairmen employed in this shop were not familiar with tactical Signal Corps radio sets; and even though technical manuals were available they were seldom read. Equipment outages resulted when recommended precautions were not followed. This personnel was not versed in supply discipline and control as practiced in the services, requirement for replacement parts were not anticipated. When stocks were exhausted, sets were cannibalized to keep nets operating. Non-expendable items such as mast sections, vibrators, microphones, speakers, etc., were discarded when they became defective resulting in confusion and extensive surveys in the clearance of property accounts upon completion of the operation.

11.5 Adequate facilities were not available for the maintenance of inter-island submarine and buoy cables. The recommendation of the AC/S J–5 to accept a fully manned cable repair ship offered by the Chief Signal Office for this purpose was disapproved by the AEC and by Hqs, JTF–3. Holmes and Narver maintenance forces were required to use a small, ill-equipped barge for cable laying and repair purposes. This barge was not sea worthy when the water in the lagoon was rough and damage to the Parry buoy cable is attributed to abuse resulting from improper cable handling facilities during the laying operation. It is recommended that an LSU be designated for use as a cable ship when occasion arises. By maintaining in storage ashore, bow and stern cable shives designed for installation on the LSU and a prong brake reel unit for cable handling,

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this equipment could in a few hours time convert the LSU to an extemporized cable ship. The stability of the LSU in a moderate sea, the mess facilities available aboard and the spacious covered deck space make the LSU an acceptable substitute for a permanent cable ship. The cable splicers of the TG 3.2 could service aboard as the technicians and be assisted by personnel of other skills to provide the ordinary labor. By this means, the cable maintenance and the small amount of laying of new cables could be done promptly and efficiently with a minimum of expense and investment. This matter should receive immediate attention.

11.6 Customary maintenance jobs performed by the various communications repair facilities to TG 3.2 together with special problems encountered follow:

11.6.1 TG 3.2 Radio Section.

11.6.1.1 All echelons of maintenance were performed on radio teletype, phone and CW receivers and transmitters including both AM and FM receivers and Stancil-Hoffman recording equipment.

11.6.1.2 No spare converters were available for the two radio teletype circuits. Ample spare BC–610 type transmitters were available. The one spare frequency bay was satisfactory for the two RTT receiving circuits. In the monitor room there were sufficient receivers with the exception of those for reception of FM Signals in the 20 to 30 MCS band. The SCR–608 could not be used on AC power.

11.6.1.3 Trouble was experienced with high harmonic radiation from the BC–610 and the T–14/TRC–1 VHF type transmitters.

11.6.2 TG 3.2 Wire Section

11.6.2.1 Maintenance work consisted primarily of installing local drops, splicing cable, installing new terminals and normal daily maintenance of the switchboard and telephone instruments.

11.6.2.2 Spare parts and installation equipment and materials were late arriving but were adequate during the operational phase.

11.6.2.3 Before adequate protective measures were taken, vehicles often hit antenna guys causing the rhombic curtain and dissipation line to break and fall requiring frequent repair and replacement.

11.6.2.4 Climatic effects on outside pole line hardware and insulations on outside drop wire also required unexpected work. In view of the fact that the air to a height of about thirty (30) feet is filled with airborne salt water spray, the matter of rust resistant hardware was investigated. The Joslyn Mfg Co. of Chicago, Ill, maker of pole line hardware, have experimented in the field of rust resistant hardware and manufacture two lines of this type of material. The firm does not manufacture messenger strand and unless similar or companion strand is used with the special hardware there is no merit in providing the hardware since rust and corrosion is dependent upon the association of dissimilar metals. The action is essentially electrolytic caused by shorting between two different metals in an electrolyte which in this instance is the airborne salt water spray. This intensity of the action depends on the separation between the metals in the galvanic series, there being a minimum of action between two metals close together in the series. Rusting of iron or steel is caused by electrolysis of the metal with metallic impurities in it. This action is minimized by galvanizing the metal with zinc which is rather close to it in the series. The first of the Joslyn rust resistant lines is composed of 18–2 passive stainless steel. It would have potentialities were a stainless steel strand available but unfortunately no manufacturer now makes this item. The second line of Joslyn rust resistant hardware is made of phosphor-bronze. Because of the lesser tensile strength of the metal larger dimensions are required for the same strength. There is no phosphor-bronze strand available but copper is adjacent to this metal in the galvanic series. Copper clad strand is available and should provide a good companion for phosphor-bronze hardware. The rust resistant hardware has a first cost of from four to eight times that of iron hardware but since the greatest cost of pole line is the labor rather than the hardware and since the rust resistant material avoids a recurrent repetition of labor costs, the higher first cost results in an eventual economy. At the time the J–5 Division made this investigation, much of the outside plant material was on order and the delivery prospects of the rust

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resistant lines were poor, hence the matter was dropped. This program merits consideration in connection with replacements and future construction in the Pacific, if the rust prevention program mentioned in Paragraph 12.6.1 is not successful.

11.6.2.5 The voltage in the teletype signals caused minor trouble on the telephone main frame by arcing across the .005″ air gap in the carbon blocks to ground. This situation was remedied by placing cellophane tape between the blocks which provided an additional .010″ and prevented the arcing.

11.6.2.6 Several switchboard jacks in the commercial Kellogg switchboard became unusable because the spot weld contacts on the ring spring of the jacks dropped, making it necessary because of its construction to renew the whole strip rather than a single defective jack.

11.6.3 TG 3.2 Installations and Maintenance Section.

11.6.3.1 The maintenance load of this section stemmed from two sources, tactical and special service radio equipment.

11.6.3.2 Tactical radio equipment used in the operation included: SCR–300, SCR–508, SCR–509, SCR–543, SCR–608, BC–342, BC–610, BC–684, BC–694, S–36, AN/GRC–9, AN/TRC–1, 3, and 4, TCS–12 and SX–28.

11.6.3.3 Special service equipment maintained included: R–100 receivers; electric pick-up; chapel organ; movie projectors, including four 16 mm carbon arcs; public address systems installed in two enlisted clubs, two officers clubs and in the consolidated mess hall; rectifiers and privately owned receivers.

11.6.3.4 A shortage of spare parts especially for the special service equipment was evident. This is not a Signal responsibility, however, the Signal Officer is charged with the maintenance of these facilities. It is recommended that the agencies requisitioning these equipments include adequate spare and maintenance parts.

11.6.3.5 Due to the tropical climate, batteries had a very short shelf and operating life. Battery operated radios could not be turned on continuously, therefore operating maintenance was extremely important in the prevention of damage from corrosion, moisture and fungi. Every effort should be made to forestall damage from climatic conditions prevalent in the Eniwetok area. The best type of moisture and fungi proofing should be used on all equipment prior to shipment from the ZI.

11.6.4 Communications Centers.

11.6.4.1 Scheduled maintenance in these sections included cleaning, oiling, greasing, and inspection of teletype equipment and crypto devices.

11.6.4.2 A shortage of spare parts was evident through most of the Operation. No spare components were available for the AN/TGC–1 equipment, and as a result outages occurred while machines were being repaired.

11.6.4.3 All teletype equipment used with the exception of the AN/TGC–1 were neutral signal operated. Continuous use, tropical humidity, intense heat and insufficient ventilation caused the machines to overheat and break down more often than would have been the case if dehumidifying equipment had been installed in the rooms in which these machines operated.

11.6.4.4 At least one spare piece of equipment of each type used in the communications center is essential if operations are to proceed with maximum efficiency.

11.7 Communications within the Navy Task Group were normal to fleet operation with the exception of Special Signal Corps type carriers and VHF radio equipment installed aboard the USS CURTISS as a back-up to the buoy cable. Arrangements were made with the Chief Signal Officer for a navy enlisted technician, assigned to Task Group 3.3, to receive special training in the maintenance of this equipment at the Signal Corps School, Fort Monmouth, N. J., prior to movement to the forward area. Communications maintenance facilities and personnel within Task Group 3.3 were adequate.

11.8 Task Group 3.4 Communication Maintenance.

11.8.1 In accordance with TB Sig 178, Technical Bulletins and manuals, a program of scheduled preventive maintenance was inaugurated within TG 3.4 communications section. This program rigorously followed, con-

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tinuously operated in keeping equipment outage to a minimum. In addition to having skilled technicians available to make repairs in instances of unforeseen equipment failures, spares and standbys were available for use when necessary. In addition to normal maintenance work, it was necessary for the AACS Maintenance Section to make installations such as runway lighting systems, interior electrical wiring of buildings and power distribution for Task Group 3.4. A breakdown of the spare equipment follows:

Transmitters 96D	—200% spares
Diversity Receivers	150% spares
Teletypewriters (M–19)	50% spares
Teletypewriters (M–15)	10% spares
Teletype Package Unit (AN/TGC–1)	40%spares
CW Receivers	30% spares

11.8.2 Adequate equipment was provided in original plans for the installation of Task Group 3.4 communications. Adequate spare parts and equipments were available for maintenance, but in certain instances, there was a shortage in type of test equipment. Frequency meters modified to function with frequency modulation were substituted for signal generators.

11.8.3 AACS maintenance space was limited. All radio and teletype maintenance was crowded into one small maintenance shop in the Receiver Station where only two technicians were able to work simultaneously. This limitation was overcome by rigid adherence to preventative maintenance schedules. By close supervision, conflict of personnel using the work shop facilities and test equipment was kept to a minimum. Repair of equipment with top priority was undertaken promptly, while repairs for equipment which had adequate back-up was undertaken when most convenient. It was seldom necessary to make use of repair facilities outside the unit. However, when it was found necessary to do so, the facilities available were found to be adequate in every respect.

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Chapter 12

ROLL-UP OF COMMUNICATIONS FACILITIES

12.1 In the interest of economy of personnel, transportation and time for setting up future operations, the roll-up of communications facilities used during Operation GREENHOUSE was planned with a view to retaining equipment on site wherever possible for re-use during subsequent operations at the AEC proving ground and involved:

12.1.1 Return of excess and surplus supplies and equipment to depot stocks.

12.1.2 Continued use and maintenance of all facilities required by caretaker and garrison forces.

12.1.3 Cocooning in place or in local warehouse storage all equipment not required by garrison forces, but for which a requirement is anticipated by the next Joint Task Force.

12.2 The following facilities will continue to be used and maintained during the garrison phase:

12.2.1 By AEC caretaker personnel (H&N):

The telephone system on Parry Island.
Tactical radio sets for Holmes and Narver boat pool.

12.2.2 By TG 3.2:

RATT circuit to USARPAC.
RATT circuit to Los Alamos.
Ship to shore voice radio circuit.
Ship to shore CW radio circuit.
CW radio circuit to USARPAC.
MARS radio station (to be established).
Military Police radio net.
Lighterage radio net.
POL radio net.
Telephone facilities on Eniwetok Island.
*Teletype communications center, Hq, TG 3.2.

Communications repair shop.
Signal Supply.

12.2.3 By TG 3.4:

Low frequency homing beacon.
Airport traffic control tower.
VHF D/F facility.
Ground Air Facilities.
- Air route CW.
- Weather reconnaissance CW.
- Air Distress 8280 KC.

Radio teletype ckt to Kwajalein.
Radio teletype weather intercept.
Facsimile Intercept.
- Guam Facsimile intercept.
- Hickam Facsimile.
- Washington Facsimile intercept.

CW weather net circuit 7M608.
Four (4) positions CW weather intercept.
Voice radio ckt to Kwajalein.
Local teletype ckts.
Local inter-communications net.
VHF/FM back-up to land line keying circuits to transmitting and receiving stations.

12.3 At the request of Hq, JTF-3, Lt. Col. Edward J. Thomas, Jr., was placed on temporary duty at Eniwetok from 10 to 20 March 1951 by the Sacramento Signal Depot for the purpose of surveying communications equipment in use by Joint Task Force THREE, making recommendations for packaging and storage of equipment upon completion of Operation GREENHOUSE, and preparing list of required preservative materials and equipment. These materials were obtained from service and commercial sources (see List 1 through 4) by the Sacramento Signal Depot with funds made available by JTF-3 and Lt. Col. Thomas returned to Eniwetok for a 30

* Essential equipment only. Carrier AN/TRC and some teletype equipment removed to supply warehouse and cocooned.

[redacted]

day period in May 1951, to supervise roll-up activities.

12.3.1 Telephone switchboards used on Runit, Rojoa, and Engebi were removed and stored on Parry Island.

12.3.2 Tactical Signal Corps equipment not required by garrison forces or caretaker personnel was turned into the signal warehouse where it was serviced, tropically packed in covered and sealed box pallets including dessicant and arranged for connection to dehumidifying units. Each container bears a list of equipment stored therein.

12.3.3 The van in which was mounted VHF equipment for back-up of inter-island cables was sealed, provided with a dehumidifying unit, and stored in the signal warehouse where the exterior would be protected from salt spray (Fig. 117).

12.3.4 Excess perishable supplies were returned to the Hawaiian Signal Depot.

12.3.5 AACS and Signal Corps transmitting equipment was left in place in the joint transmitter building. Transmitters and back-up power units not required by garrison forces were cocooned in place, a transmitter attendant from the garrison force will be on duty 24 hours daily to perform preventive maintenance on equipment in use. Figs. 118 and 119. Roll-up of TG 3.4 Auxiliary Power units is illustrated in Fig. 120.

12.3.6 Receiver Building: Crystal grinding equipment was returned to Hawaii at the request of the Signal Officer, Hq, USARPAC, for use by that organization. Monitor receivers and all equipment in the receiver building not required by garrison forces was stored in the monitor room of the receiver building. This room was sealed and provided with a dehumidifying unit.

12.3.7 The Hq, JTF-3 Communications Center on Parry Island was sealed with equipment in place and provided with a dehumidifying unit. Hq, JTF-3 inter-communications equipment and emergency power units for the communications center were also stored in this space.

12.3.8 TG 3.3 communications equipment installed aboard the USS CURTISS to meet special requirements of JTF-3 is being retained aboard for re-use during subsequent operations.

12.4 Roll-up Procedure.

12.4.1 A detailed account of the overall roll-up of communications is included as Appendix IV of this report, entitled "Preservation and Disposition of Communications Equipment and Expendable Supplies at Eniwetok Atoll." This report was submitted by Lt. Col. W. E. Thomas, Jr., of the Sacramento Signal Depot upon completion of the roll-up on 28 June 1951.

12.4.2 All material stored was checked by maintenance personnel to insure serviceability at time of storage.

12.4.3 Where all equipment in a building was to be stored, e.g., Building #221, Communication Center, Parry Island, it was advantageous to seal and dehumidify the entire rooms housing the equipment. The room was sealed by application of cocoon solution to aluminum sheeting placed over the acoustic tiling on the interior surfaces, with double application to the exterior of window and door facings.

12.4.4 Other Signal Corps property was packed in the signal warehouse, Building #83, Transmitter Power Building #5, Communications Center Power Building #512, and the Monitor Room of the Receiver Building #84, all on Eniwetok Island.

12.4.5 Storage in the warehouse required 100 box pallets providing 9,500 cu. ft. of storage space and occupying 1,100 sq. ft. of floor space. The pallets were placed three high and three deep in aluminum pans, each tier cocooned as a unit.

12.4.6 The monitor room package of teletype and receiver equipment occupied 29 sq. ft. of floor space and provides 123 cu. ft. of storage.

12.4.7 AACS communications equipment was packaged under direction of TG 3.4, utilizing Air Force personnel supervised by Lt. Col. Thomas.

12.4.8 Supplies packaged were placed within cocoon-type vapor proof barriers with humidity control at 30 per cent.

12.4.9 Supplies stored as a complete unit were left within sealed rooms with humidity control at 30 per cent.

12.4.10 Humidity is controlled by means of silica gel or dehumidifying machines and in-

[redacted]

FIGURE 117. Communications Equipment Cocooned in Signal Warehouse, Eniwetok Island

[redacted]

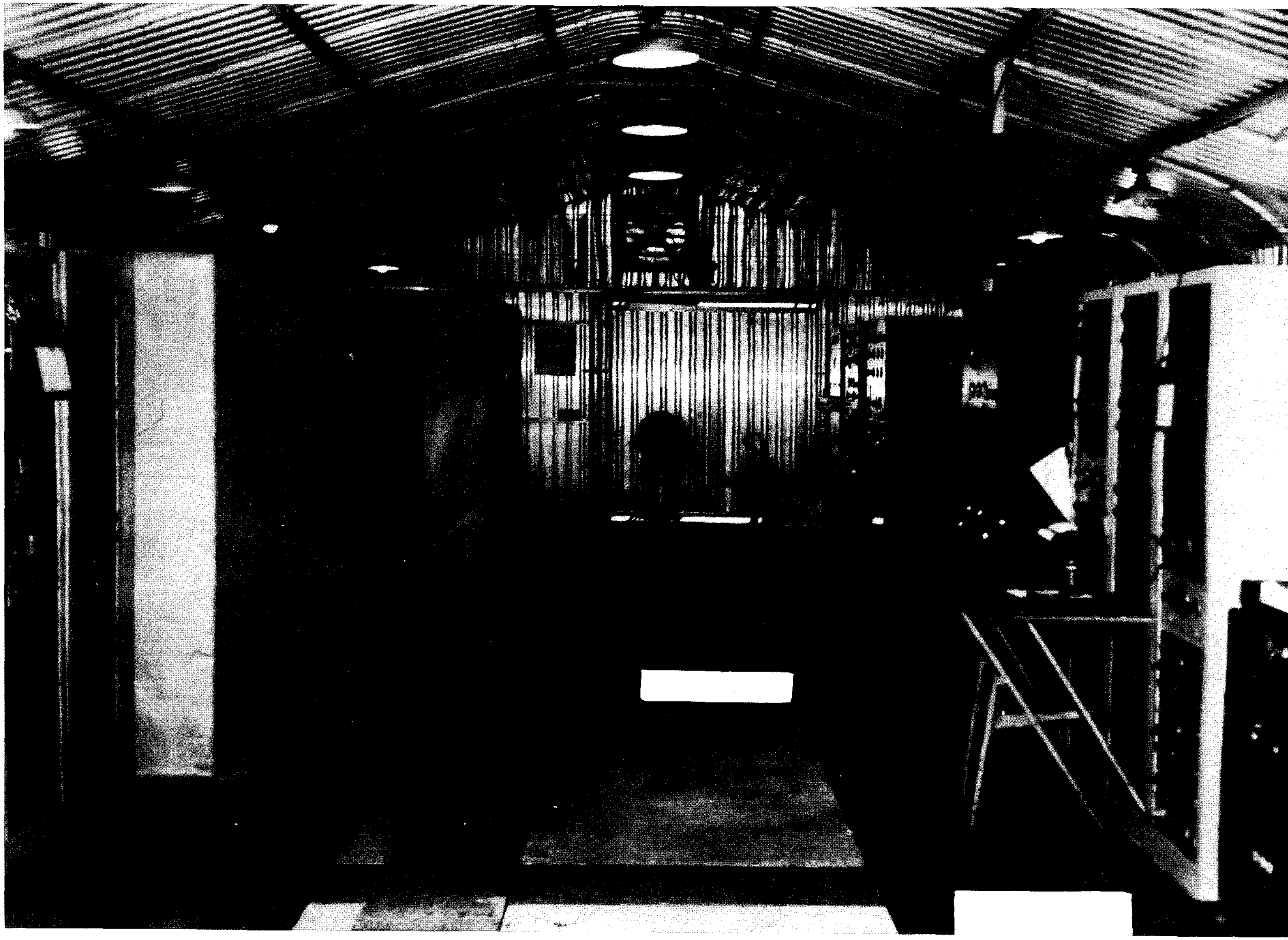

FIGURE 118. TG 3.4 Equipment Cocooned in Place, Joint Transmitter Bldg.

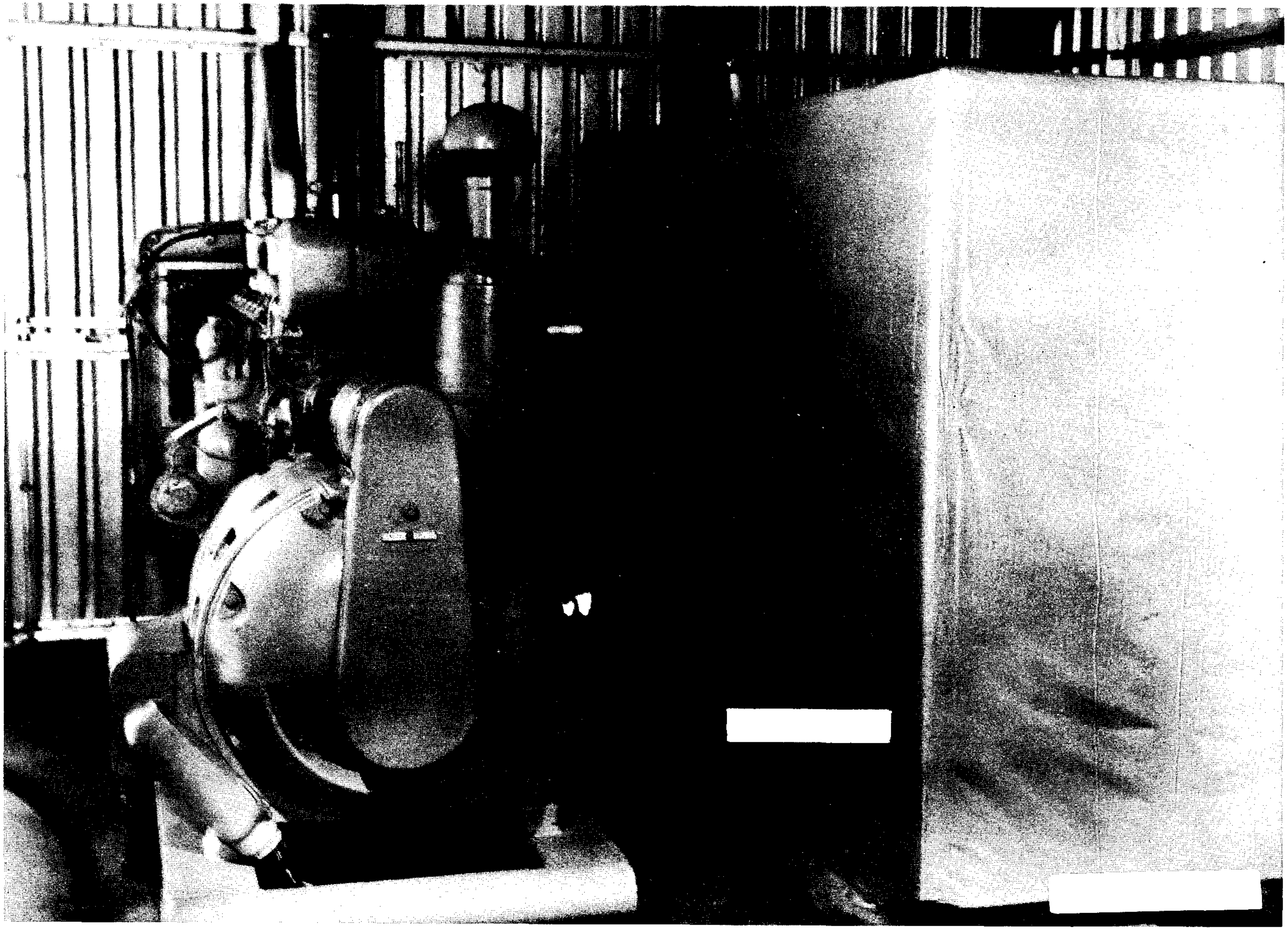

FIGURE 119. PE 215 Cocooned in Place, Joint Transmitter Station

[redacted]

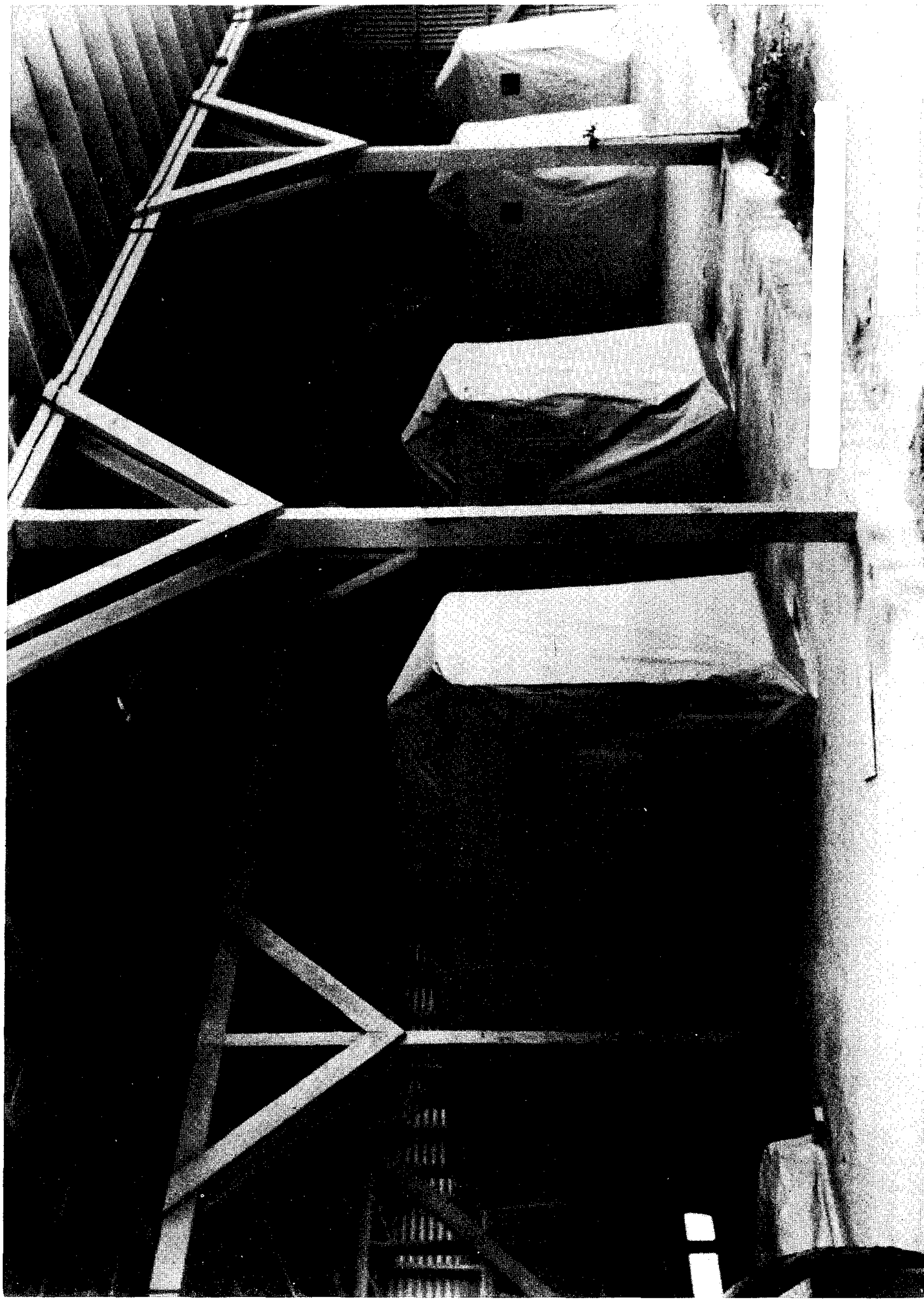

FIGURE 120. TG 3.4 Power Units Cocooned in Place

[redacted]

[redacted]

dicators recommended by air-conditioning design section of the San Francisco Naval Shipyard.

12.5 Surveillance of Packaged Equipment.

12.5.1 The following instructions have been issued to the Eniwetok Garrison Detachment with reference to preservation of operational reserve stocks of communications equipment:

12.5.1.1 Periodic weekly inspection of all packages will be made, with readings taken and recorded of humidity in each package number, and duplicate copies will be forwarded monthly to J–5 Division, JTF–3, with pertinent remarks.

12.5.1.2 In the event humidity is above 35% or below 25%, authority is given to replace dessicant as required, or if dehumidifying machines have been installed, to replace the cartridge.

12.5.1.3 Whenever a package is opened for any reason, a disinterested witnessing officer will be present, to sign a statement to the effect that no equipment, supplies or other material were removed from the cocooned package. Witnessing officer will be designated by the garrison accountable property officer. A copy of the report will be retained in the Signal Office files, and one will be delivered to the accountable property officer.

12.5.1.4 The K–53 van is held on M/R from the Air Force unit by the Garrison Signal Officer, and contains inter-island cable backup equipment, which in turn is stored within the warehouse (Bldg. #83) as a cocooned package.

12.5.1.5 A limited number of personnel at Eniwetok have been trained to care for the cocooned equipment. The Garrison Signal Officer must insure a successful long time storage program to include training of personnel in care of cocooned equipment.

12.5.1.6 A detailed listing of cocooned packages prepared in book form for permanent record of reading was left with the Signal Officer at Eniwetok who will maintain this as a permanent and complete performance picture of the vapor proof packages.

12.5.1.7 In-storage maintenance of equipment and supplies will be the responsibility of the Garrison Signal Officer.

12.5.1.8 Requisition of cocooning supplies will be made through normal Signal Supply channels.

12.5.1.9 In-storage equipment list has been left with the Signal Officer and Account Property Officer.

12.6 Preservation of Antenna Hardware.

12.6.1 Two different methods of preservation of pole line hardware in the TG 3.2 antenna area were undertaken in an effort to minimize the action of rust which results from the layer of airborne salt spray to a height of about 30 feet. Some of the hardware was painted with a cold paint and some with a hot application of asphalt compound. The advocacy of these methods is the subject of monthly reports from the Signal Officer of TG 3.2 (soon to become TG 132.2). The success of both of these methods is measured by a companion with the antenna guys of the AACS installation in the same neighborhood, which was entirely untreated.

12.6.2 A monthly report to be submitted to the J–5 Division, Hq, JTF–3, by the Garrison Signal Officer will include the following items:

12.6.2.1 Transmitter Antenna Farm.

12.6.2.1.1 Heat applied compound (used to coat hardware). (Check one)

Intact.
Peeling.
Replacement necessary.

12.6.2.1.2 Effect of compound treatment on: (Check one)

Guys

Excellent condition.
Evidence of minor rust.
Evidence of heavy rust.
Replacement necessary.

Clamps, anchors, servings, etc. (Check one)

Excellent condition.
Evidence of minor rust.
Evidence of heavy rust.
Replacement necessary.

[redacted]

12.6.2.1.3 Condition of: (Untreated) (Check one)

Guys

Excellent condition.
Evidence of minor rust.
Evidence of heavy rust.
Replacement necessary.

Hardware (clamps, anchors, servings, etc) (Check one)

Excellent condition.
Evidence of minor rust.
Evidence of heavy rust.
Replacement necessary.

12.6.2.2 Receiver Antenna Farm.

12.6.2.2.1 Cold applied compound (used to coat hardware). (Check one)

Intact.
Washing off.
Replacement necessary.

12.6.2.2.2 Condition of compound treatment on: (Check one)

Guys

Excellent condition.
Evidence of minor rust.
Evidence of heavy rust.
Replacement necessary.

Hardware (anchors, clamps, guys, servings, etc) (Check one)

Excellent condition.
Evidence of minor rust.
Evidence of heavy rust.
Replacement necessary.

12.6.2.2.3 Condition of: (Untreated) (Check one)

Guys

Excellent condition.
Evidence of minor rust.
Evidence of heavy rust.
Replacement necessary.

Hardware (clamps, anchors, guys, servings, etc) (Check one)

Excellent condition.
Evidence of minor rust.
Evidence of heavy rust.
Replacement necessary.

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Chapter XIII

INTERIM OPERATION

13.1 General

13.1.1 This chapter deals with communications activities in the forward area essential to the Garrison Force for caretaker requirements.

13.2 Telephone

13.2.1 The telephone installations on Parry and Eniwetok Islands remain fully operative. Those north of Parry have been closed out in that the switchboards have been removed to Parry Island where they are stored by the contractor in Bldg #211 which is air conditioned.

13.2.2 On Eniwetok Island, a fire and guard reporting system utilizing pairs in the fixed telephone plant has stations so located that there is at least one telephone in a weatherproof box on each of the prescribed guard posts. Circuit 117 is reserved exclusively for reporting all fire calls into the fire station.

13.3 Radio

13.3.1 The Los Alamos-Eniwetok radio teletype circuit remains in operation on a reduced schedule. A plan recommended by the AEC for the hours of operation of this schedule is on file with the Garrison Signal Officer. Essentially this prescribes that during the period 1 July to 1 January, operation will be on an eight hour day. Beginning 1 January, operations increase to 16 hours per day and just prior to the scheduled tests operation is to return to 24 hours per day.

13.3.2 Radio teletype circuit to Oahu and the CW back-up thereto are operational 24 hours per day.

13.3.3 Ship-shore radio both voice and CW is operational on a 24 hour basis; as also is the circuit P–33 connecting the Atoll Commander with the Commander, Naval Operating Base, Kwajalein. There is a 24 hour guard maintained on 500 Kcs, the international distress frequency. No transmitter is provided for this circuit. In case any distress calls are received, the Naval Operating Base, at Kwajalein will be notified.

13.3.4 The Search and Rescue (SAR) requirements from Eniwetok which normally are a responsibility of the Air Task Group during an operation, are under the supervision of the Signal Officer of the Army Task Group for the interim period. It is desired to indicate that search and rescue involves more than aircraft search and rescue in the forward area. The amount of shipping, both ocean going and local necessitates a constant alert for any boat or ship which may be in distress within the Restricted water area.

13.3.5 For the contractor in the forward area, 15 SCR 508's, 6 SCR 619's, 3 Navy TCS radios, 3 SCR 300's, and 4 Rectifiers RA–83 are required for miscellaneous communications such as boat pool, lighterage nets and working parties ashore on islands other than Parry and Eniwetok. In addition the Army Task Group maintains equipment in operational status for lighterage nets, boat pool nets, POL nets, military police radio and tactical defense nets.

13.3.6 Air ground communications consists of the normal tower, airstrip and operational circuit requirements and are operated by the air task group elements remaining at Eniwetok. This element is furnished by AACS in the form of a team which is required to do the specific job.

13.4 Cryptography

13.4.1 Cryptographic requirements are accomplished by the communications center at Eniwetok. For classified traffic handled by the contractor, a direct circuit has been in-

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stalled from the Eniwetok Communications Center to the office of the contractor on Parry. This circuit is approved to handle in the clear, traffic classified as high as SECRET.

13.5 Equipment

13.5.1 Such Signal equipment as is required for future operations and which has been cocooned for safekeeping, is a responsibility of the Garrison Signal Officer. The specific inspection and maintenance to be accomplished in this connection are contained in the section of the report dealing with cocooning. To provide for the Garrison Communications requirements, less those of the Air Task Group, a table of distribution calling for two officers and 29 enlisted men (Figure 121) has been authorized.

FIGURE 121
COMMUNICATION DETACHMENT
7127th ARMY UNIT
APO 187

17 April 1951

Proposed T/D for Communication Detachment, 7127

	MOS	*NO.*					*"Q"*	*CRYPTO*
Signal Officer	0210	1					1	1
Msg Center Officer Field	0222	1					1	1
TOTAL		2					2	2
	MOS	*NO.*	*E–7*	*E–6*	*E–5*	*E–4*	*"Q"*	*CRYPTO*
Cen. Off Tel Swbd Supvr	1309	2		1	1		1	
Swbd Operator	4309	2				2		
Rad Oper High Speed, Chf	1766	1		1				
Rad Oper High Speed	3766	1			1			
Rad Oper Inter Speed	4740	2						
Chief Sig Sup Sped	1581	1	1					
Clerk Typist	4405	1				1		
Crypto Sup	1805	2	1		1		2	2
Crypto Spec	4805	1				1	1	1
Crypto Repairman	1801	1	1				1	1
Field Rad Repair Supv	1648	1	1				1	
Field Rad Repairman	3648	1			1			
Fixed Sta Rad Rep Supv	1649	2	1	1			1	
Cent Off Supv	1261	1	1				1	
Tel Install Repairman	3097	1			1			
Manual Tel Supv	2237	2		1	1			
Manual Tel Oper	4237	2				2		
Cable Splicer	2039	1		1			1	
Powerman	3166	1				1		
Sig Msg Supv	1674	3	1		2		1	
TOTAL:		29	7	5	8	9	9	4

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Chapter XIV

CONCLUSIONS AND RECOMMENDATIONS

14.1 General

14.1 Based largely upon material included in the preceding pages of this report, the following conclusions and recommendations relative to future operations at the Eniwetok Atoll Proving Grounds are derived from experience gained during the planning and operational phases of Operation GREENHOUSE. Each conclusion is referenced to text material supporting it.

14.2 Matters Requiring Attention During the Period of Interim Operation

14.2.1 In view of the fact that a great deal of confusion was encountered at Eniwetok in the execution of the J–5 mission of controlling wire circuits, it is concluded that the operational control and assignment of cable pairs in the entire atoll telephone system should be under one head. During the construction period, no central control was exercised. E.G.G. (a contractor who provided timing signals), H&N, Signal Officer of TG 3.1, and Signal Officer of TG 3.2, gave orders to the Parry Island wire chief, and coordinating authority was ignored. No attention was paid to the JTF–3 directive in the Field Order that this was a function of the J–5 Division. If this control is centralized in the J–5 Division and operated in the interim period by the Signal Officer, TG 132.2, an efficient control will result. Holmes and Narver would still be responsible for all construction work involved in laying new cable and providing distribution, except that on Eniwetok Island which would be the responsibility of CTG 132.2. (Ref: Para 7.1.)

14.2.2 The arrangements made by H&N for laying and splicing submarine cable involved the employment of skilled labor on contract from the Pacific Telephone and Telegraph Co., and the utilization of a clumsy and unwieldy barge at Eniwetok. It is believed that these practices are slow and uneconomical. In lieu of the cable ship proposed by the ACofS J–5, Hq, JTF–3, for Operation GREENHOUSE, it is concluded that an LSU with shives and other appropriate locally fabricated gear, temporarily installed, would serve as an extemporized cable ship with cable and ships crews provided by H&N, and technicians (cable splicers) furnished by CTG 132.2. This vessel, it is believed, would prove very efficient and adequate for cable laying in the relatively still waters of the lagoon. (Ref: Para 11.5.)

14.2.3 During the interim period and until Hq, JTF–132 becomes operational at Eniwetok Atoll, there is a necessity for local exercise of the J–5 mission. It is concluded that this can best be accomplished by having the Signal Officer, TG 132.2, serve as an advanced element of the J–5 Division, in addition to his other duties.

14.2.4 Prior to the next operation there should be an increase in local cables on Eniwetok Island to afford adequate local telephone service. Some of the present cables are completely filled in areas where additional service is required. It is concluded that the J–5 Division, JTF–132, should prepare a cable project based upon experience and anticipated loads and that JTF–132 should transmit the project to TG 132.2 for execution. The material for installation would be obtained from Signal Corps depot stock. (Ref: Para 3.1.2.7.)

14.2.5 The present telephone switchboards on Eniwetok and Parry Islands were so congested during Operation GREENHOUSE as to be inadequate to render service of a satisfactory standard. It is concluded that H&N should procure with the approval of AEC, and the employment of AEC funds, two (2) four-position multiple manual, 300 line switch-

[redacted]

boards with the same cord circuit features as in the present boards. H&N should install one of these switchboards on Parry Island, and TG 132.2 should install the other on Eniwetok Island. This will also involve the provision of new storage batteries of increased size, and larger capacity charging equipment. (Ref: Para 3.1.2.7.)

14.2.6 There is a need for a separate code room for TG 132.4 The absence of such a facility during Operation GREENHOUSE was a result of compromise and expediency. The practice of TG 132.2 performing cryptographic service for TG 132.4 is not efficient in that it divides responsibility for speed and accuracy. It is concluded that a code room with floor space about 20 x 24 feet should be built outside of Building #89 on Eniwetok and adjacent thereto, conveniently located with respect to the TG 132.4 communications center. (Ref: Para 3.1.3.6.)

14.2.7 On occasion there was a demand for cryptographic facilities on Parry Island for handling Restricted Data and special intelligence messages, requiring interruption of normal JTF cryptographic operation, to permit special cryptographic personnel exclusive use of the code room. It is concluded that an additional small code room of about 10 x 20 feet floor space should be provided in the JTF Hq Building on Parry Island. This code room should be equipped with one-time tapes and one-time pads to allow specially cleared cryptographic personnel of Hq, JTF–132, to handle special intelligence reports, without interruption of normal message handling. (Ref: Para 6.2.2.)

14.2.8 Climatic conditions at Eniwetok Atoll are such that when one is in a confined space away from the breeze, it becomes very hot and uncomfortable. This heat is further increased when machines and electronic equipment are operated in this confined space. The effect of this heat is markedly reduced by lowering the relative humidity. It is therefore concluded that in addition to the dehumidifying equipment installed for the telephone exchanges, similar equipment should be provided as originally planned, to dehumidify the JTF–132, TG 132.2, and TG 132.4 communications centers and code rooms. Experience with the telephone exchanges has proven that the dehumidification not only effects personnel efficiency and comfort, but also decreases maintenance markedly. (Ref: Para 3.1.3.6.)

14.2.9 In view of the fact that incandescent lighting generates heat and quite powerful lamps are required to provide an adequate level of illumination in code rooms and communications centers, it is believed that the present incandescent lamps in code rooms and communications centers should be replaced with fluorescent lights. The efficiency of communications is to a large extent influenced by the comfort of the men and the adequacy of the illumination under which they work. (Ref: Para 3.1.3.6.)

14.2.10 Male telephone operators with previous experience are difficult to find in civil life because commercially, this work is usually performed by female labor. Furthermore, the salaries paid H&N personnel working outside of the continental limits of the U. S. are of necessity extraordinarily high for skills such as telephone operators. Signal Corps enlisted men are readily available from the Signal Corps and enlisted personnel assigned to duty at Eniwetok have a less frequent turnover than the civilian personnel employed by Holmes and Narver. It is therefore concluded that were the operation and maintenance of all telephone switchboards of the Eniwetok Atoll assigned as a responsibility of the military personnel that more efficient and economical operation of the telephone system would result. (Ref: Para 2.2.4.)

14.2.11 During Operation GREENHOUSE, the inter-island submarine cables and the buoy cables were utilized to capacity and some facilities which would otherwise have been provided were not installed because of lack of available cable pairs. It is concluded that demands for pairs in the inter-island cables and the buoy cables during Operation GREENHOUSE should be reviewed and a study made to determine whether or not additional cable pairs should be provided. Were the result of this study to reveal the desirability of providing cables, they should be procured and installed by H&N utilizing AEC funds. (Ref: Para 3.1.2.7.)

[redacted]

14.2.12 Comment has been made in the preceding pages of the report relative to the fact that no facilities were provided on Parry Island for the storage and maintenance of equipment used by the J-5 Division, Hq, JTF-3 and that the Signal Officer, TG 3.1 had to use storage space belonging to H&N. It is concluded that a building should be provided on Parry Island for this purpose, so partitioned as to segregate the J-5 space from that of the Signal Officer, TG 132.1. It had originally been contemplated that there would be a maintenance work bench in the communications center, but when the equipment was installed therein, there was insufficient space remaining in the communications center for the provision of a maintenance shop. It is estimated that a building for the purposes in question should be of standard design and have a length of approximately 60 feet.

14.2.13 The experience in Operation GREENHOUSE with teletype service to the ship's buoy off Engebi Island indicated the necessity for a carrier repeater on Rojoa Island. It is believed that this equipment could be installed on Rojoa in Building #69 and be placed in operation by the telephone operator whenever a ship was anchored to the buoy off of Ebiriru or Engebi Islands. (Ref: Para 3.1.4.2.)

14.2.14 During Operation GREENHOUSE TG 3.2 prepared a plan to meet emergencies and overt acts. This plan did not rest upon a companion document prepared by JTF-3. It is believed that JTF-132 should prepare a directive plan to authorize and guide TG 132.2 in the preparation of its local plan. Communications plans should include emergency communications. (Ref: Para 3.3.2.)

14.2.15 Communications centers and crypto rooms have considerable material which by regulation must be destroyed by burning in the presence of competent witnesses. No facilities were provided during Operation GREENHOUSE for this activity and a wire basket was improvised for use on Parry Island by Hq, JTF-3. It is concluded that Hq, JTF-132 and the Headquarters of Task Groups 132.1, 132.2, and 132.4 should be provided with incinerators for the destruction of classified material and that the construction of these incinerators should be something better than the extemporized equipment utilized in Operation GREENHOUSE. (Ref: Para 5.7.3.)

14.2.16 Considerable difficulty was experienced in duplex operation at Los Alamos of the radio teletype circuit between Los Alamos and Eniwetok. This was caused by the lack of adequate separation between the transmitter and transmitting antenna sites and the receiver and receiving antenna sites. It is believed that steps should be taken to provide receiving facilities at Los Alamos which are adequately separated from those provided for transmission. (Ref: Para 3.4.19.)

14.2.17 The Butler Building on Eniwetok which was used as a Signal Corps warehouse is in fair state of repair, and with adequate maintenance, it will probably be usable for several years. However, without extensive maintenance, its future expectancy is so short that steps should be taken to replace it whenever a building program is inaugurated to replace the other warehouse buildings, which are in considerably poorer condition. Any warehouse provided for the storage of signal equipment should have a base construction of either aluminum or concrete so as to raise the eaves from 4 to 6 feet above the height provided by the normal aluminum building design and the cubic content of any new building should be the equivalent of that of the Butler Building which it replaces. (Ref: Para 1.14.)

14.2.18 Transmitting and receiving AN/TRC antennas for equipment installed in the JTF communications center were separated by approximately 60 feet instead of 100 feet as specified to installation personnel. As a result, some interference was experienced between the receiver and transmitter of the same system. It is recommended that proper separation of these antennas be accomplished in the interim by the Signal Officer, TG 132.2. (Ref: Para 3.1.4.4.)

14.2.19 Appendix III of this report is a list of non-expendable items of Signal Corps equipment used by the various Task Groups during Operation GREENHOUSE and approved by the D/A for retention at Eniwetok for re-use during subsequent operations. It is recommended that the Asst. CofS J-5, JTF-132 and the Signal Officer, TG 132.2 review this list for adequacy and take action to obtain necessary

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additional equipment as soon as the Task Force mission at Eniwetok is known. (Ref: Para 10.6.5.)

14.3 Organization

14.3.1 It is believed that the mission of the J–5 Division is susceptible of clarification and more explicit delineations. It is concluded that it should be as follows:

14.3.1.1 Preparation of the general plan of Joint Task Force communication system embracing all echelons.

14.3.1.2 Establish, supervise, and control the Hq, JTF communications facilities.

14.3.1.3 The control and assignment of all radio frequencies, address groups, routing indicators, etc.

14.3.1.4 Exercise operational control of the Eniwetok telephone system, and the assignment and allocation of all wire circuits in local inter-island and buoy cables.

14.3.1.5 Provide liaison with Task Group headquarters relative to communications planning and review Task Group communications plans for approval by Joint Task Force headquarters.

14.3.1.6 Planning of back-up measures in event of failure of cables.

14.3.1.7 Preparation of communications sections of Joint Task Force Emergency Plan.

14.3.1.8 The supervision of supply of communications equipment and materials.

14.3.2 Prior to arrival in the forward area it had not been planned that there would be a Deputy for the Assistant Chief of Staff, J–5. During early planning, consideration had been given to specifying the assignment of a TG 3.1 assistant to the J–5 office, but after considerable discussion, it was agreed that the 3.1 communication assistant would serve as a cryptographic specialist. In the forward area, during operations, he was of little value to the J–5 Division, since he worked in Hq, TG 3.1, but was not a part of the TG 3.1 Communications Section. In the foregoing pages of this report, recommendation has been made that the Signal Security Section be represented under the J–5 Division, with one (1) officer and one (1) clerk, and that the operating echelons of Signal Security Section be made a part of the J–5 office but function as a detachment on Eniwetok. In view of these facts it is believed that the J–5 Division should consist of the Communications Officer (ACofS, J–5); Deputy, J–5, with responsibility for headquarters communications service, and functioning in the absence of the J–5; Assistant in charge of Signal Security, and one assistant from each of the Services (Army, Air Force, Navy, and AEC). The Army Assistant would be responsible for administration and supply; the Air Force Assistant responsible for electronics suppression and interference program; the Naval Assistant responsible for radio; and the AEC assistant responsible for coordination of scientific communication requirements; in addition, there should be a technical consultant from the Signal Corps Engineering Laboratories; a chief clerk, one civilian stenographer (Rear Echelon); two enlisted stenographers and one Signal Security clerk. (Ref: Para 2.1.9.)

14.3.3 During Operation GREENHOUSE the Signal Security Section operated from the J–5 Division and utilized the services of four officers, a civilian specialist, and eight enlisted men. In line with recommendations that the operating functions of Signal Security be removed from the J–5 Division office, it is concluded that a Signal Security Section be provided with the following teams:

14.3.3.1 Cryptographic Security Team.

14.3.3.2 One CW and high frequency voice radio monitor team for two positions.

14.3.3.3 One AM voice radio monitor team for two positions.

14.3.3.4 One security analysis team.

14.3.3.5 One security control team.

These teams with van-mounted equipment should operate on Eniwetok Island from an area in the vicinity of the receiver station and should be under the control of the Chief of the Signal Security Section in the J–5 Office. If a cover and deception plan is implemented, additional teams will be required, depending upon the extent of the mission. (Ref: Para 5.11.1.)

14.3.4 In line with recommendation made in the preceding pages, it is concluded that for an effective signal security program, each Task Group communications officer should have the assistance of a task group security officer to insure attention being given to com-

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munications security matters at Task Group level. (Ref: Para 5.11.3.)

14.3.5 During Operation GREENHOUSE, there was one centralized agency for monitoring. It performed security monitoring and also provided monitoring service for one of the scientific programs. Part of the time it operated under the radio officer of TG 3.2, and part of the time under a Naval Officer of the Signal Security Section. This operation was not satisfactory, and in line with conclusions already reached, signal security monitoring should be a function of the Signal Security Section, and monitoring service for scientific programs should be conducted by the project officer with facilities independent of the operating communications. The Army has recently organized Electronics Countermeasures teams and is prepared to provide a small team for surveillance monitoring of radio circuits. Such a team would be extremely valuable in connection with future operations. It is concluded that a surveillance monitoring team of one officer and five enlisted men, with van-mounted monitoring equipment should be used by TG 132.2 and operate directly under the control of the J–5 Division with station at Parry Island. (Ref: Para 4.2.11.)

14.3.6 The system of operational control by the J–5 Division of all of Hq, JTF–3 communications operated successfully during Operation GREENHOUSE and it is concluded that it should be continued for any operations of JTF–132.

14.3.7 The rear echelon establishment of J–5 Division, JTF–3 with one officer, one civilian clerk stenographer and six message center and code clerk personnel proved efficient and it is concluded that this is an adequate organization for JTF–132.

14.3.8 In connection with personnel planning for JTF–3, the ACofS J–5 made the initial determination not to use 11–500 teams, since the 11–500 are primarily for field organizations and contain many spaces not required for installation, operation, and maintenance of fixed plant such as was established on Eniwetok Atoll. Further merit in this decision resided in the fact that since the organization was tailor-made for the job, 11–500 teams were not available to be diverted to Korea at the expense of Operation GREENHOUSE. A defect in the failure to use 11–500 teams appears to have been that personnel in some instances lacked the training and experience expected according to MOS by which requisitioned. On the whole, however, tailored Tables of Organization for the job appears to have been more satisfactory than would have been achieved had 11–500 teams been specified. It is estimated that there was thereby effected a saving of approximately 50 jobs, or substantially 25%. It is therefore concluded that for future planning, JTF– and Army Task Group communications personnel should be provided on a Table of Organization established for the job and that 11–500 T/O&E be used only as a guide for this planning. (Ref: Para 1.2.3.)

14.3.9 Due to the fact that an installation program was involved in preparations for Operation GREENHOUSE, personnel was staged to arrive according to an anticipated time table of completion. The initial detachment was largely composed of supply personnel. This was augmented later by technicians who were sent out initially for installation and to be used subsequently for maintenance. The last personnel to be dispatched to the Pacific was largely operating personnel. Now that the Atoll Communications System and facilities have been constructed, and practically all the equipment necessary for its functioning is on hand, either in operation or in storage, it is believed that the Signal Corps Company for operation and maintenance of JTF–132 and TG 132.2 facilities should be organized in the ZI prior to the operation, and be moved as a body to Eniwetok. The time table for such an organization would involve the organization of the unit on 0–6 months followed by a period of screening, clearing, and training, and departure for the theater on 0–4 months, arriving at Eniwetok Atoll approximately 0–3 months. In the three months prior to the operation the personnel would be utilized initially for unpacking, de-cocooning, and servicing the installed equipment and thereafter would engage in training for operations, and would acquire sufficient experience in approximately 60 days to provide an efficient organization by the time that Hq, JTF–132 arrived at Eniwetok and opened on "O" day. (Ref: Para 2.3.8.)

14.3.10 It is concluded that the mission of the Communications Section, TG 132.1, in

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light of conclusions and recommendations contained elsewhere in this report, be amended to relieve the communications officer, TG 132.1 of the responsibility for the telephone and cable system, and for the editing and publishing of the Atoll Telephone Directory. (Ref: Para 14.2.10.)

14.3.11 During Operation GREENHOUSE the Communications Section of the D-3 Division of TG 3.1 was extremely overloaded because of the fact that only one individual was assigned to this section. The Signal Officer without assistants is inadequate to provide the services required of him by the mission assigned. It is concluded that the TG 132.1 communications officer should be provided with sufficient staff to enable him to perform the assigned functions. (Ref: Para 2.2.2.)

14.3.12 During Operation GREENHOUSE the communications officer, TG 3.1 had no personnel assigned under his immediate control for operation and control of communications facilities, and it is concluded that it is essential that adequate installation, maintenance, and operating personnel be assigned to a section under the immediate control of the communications officer, TG 132.1, to enable him to properly discharge his functions, instead of having to borrow personnel from the contractor and elsewhere. (Ref: Para 2.2.2.)

14.3.13 It is concluded that the communications mission of TG 132.2 should be extended beyond that of the Communications Officer, TG 3.2, by the addition of the responsibility for the operation and maintenance of the inter-island and buoy cable system and all telephone exchange services, under operational control of the J-5 Division, and also responsibility for editing and publishing the atoll telephone directory. (Ref: Para 14.2.10.)

14.3.14 It is concluded that the organization for TG 3.3 was adequate and efficient, and should provide a basis for the organization of TG 132.3. (Ref: Para 2.4.1.)

14.3.15 The communications organization of TG 3.4 was efficient. However, in light of comments appearing in the foregoing pages of this report, it is concluded that this office should have been augmented by Hq Squadron Communications Officer and Communications Section with responsibility for establishing and operating TG 3.4 communications. (Ref: Para 2.5.5.)

14.3.16 The inability of AACS to provide code clerks (MOS 805) for Operation GREENHOUSE resulted in a division of responsibility between TG 3.2 and TG 3.4 for the accuracy and speed of cryptography for TG 3.4. It is therefore concluded that the AACS Detachment for TG 132.4 should include an adequate number of code clerks to provide TG 132.4 with efficient cryptographic service. (Ref: Para 3.1.3.5.)

14.4 Plant Items for Future Operations

14.4.1 Fixed plant teletype equipment (commercial models #19 and #15) would have been more satisfactory for installation in the JTF and Army Task Group communications centers than the field type sets (TG 7B and TG 26-A) which were used. The field equipment occupies more space than equivalent commercial models and includes a number of components which are not required and present an additional storage problem. As replacements are required, it is recommended that field equipment be replaced with commercial models. (Ref: Para 3.1.3.6.)

14.4.2 The Southern Chain Loran System, with master station on Kwajalein and slave stations on Majuro and Bikati, provided extremely valuable and essential coverage in the Southern Pacific area not covered by the newly established Northern Chain, having master station at Eniwetok with slave stations at Kwajalein and Wake. The latter chain is essential for covering the commercial routes through Wake and the area north of Eniwetok. Since the Coast Guard plans to retain the Northern Chain, and has abandoned the Southern Chain, which is so necessary to operations in the Marshall Islands, it is concluded that for subsequent operations either the Air Force or the Coast Guard should provide mobile van-mounted Loran equipment to be installed temporarily at the sites previously occupied by the Southern Chain stations, and by this means a temporary Southern Chain be re-established for the period of any future operations. The existing maps for the now obsolete permanent Southern Chain should be retained and the charts issued during future

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operations for the positioning of aircraft in the area covered by the new mobile Southern Chain. (Ref: Para 3.1.10.2.)

14.4.3 The Hq, JTF-3 Operations Center consisted of an Army, Navy, Air Force and Scientific Desk, each provided with a direct telephone line to the operations officer of the corresponding Task Group; a Radiological Safety Desk provided with a direct telephone line to RadSafe Headquarters; and a weather desk with a direct telephone to the weather central on Eniwetok. Two lines from the Parry Island switchboard and one line from the Eniwetok Island switchboard terminated in individual instruments placed on the center of the operations desk requiring any of the operations officers to leave the desk and walk to the phone to answer or initiate calls over these lines. It is recommended that one of the two Parry exchange lines and the Eniwetok exchange line be made available to each desk by installing three-position pick-up keys associated with each of the direct line telephone instruments. (Ref: Para 3.2.4.1.)

14.4.4 During Operation GREENHOUSE there was a demand for public address systems for the briefing of observer personnel, and the fact that this requirement was not stressed in preliminary planning caused many expedients to be devised. It is concluded that preliminary planning for subsequent operations should visualize this requirement and make adequate provision for both AC and DC operated public address systems. (Ref: Para 3.2.4.3.)

14.4.5 Tape recorders were provided in Operation GREENHOUSE for monitoring purposes and it was not intended that the J-5 Division provide recorders for making permanent historical record of the various phases of the operation. To meet this situation, various expedients were arranged, and some privately-owned equipment was borrowed. It is concluded that the J-5 Division in planning for future operations should make adequate provision of tape recorders for historical record and re-broadcast. (Ref: Para 3.2.4.3.)

14.4.6 There were several instances where SCR-300 radio equipments were provided for extremely short-range operation on the Shot Islands, and for use between boats and the shore. It is believed that this requirement could adequately be met by relatively lightweight electronic megaphone equipment, and it is concluded that such equipment should be provided for future operations. An example of this type of equipment is the portable voice power DYNAMIKE manufactured by the Jacque Engineering Corporation, 14060 Chandler Blvd., Van Nuys, California. It is believed that the Navy has standardized this piece of equipment. (Ref: Para 9.9.1.)

14.4.7 The Signal Security Section of the J-5 Division employed a special keying device (ARPACAS) for transmitting timing signals under security cover to outlying AFOAT-1 stations. The ARPACAS equipment caused considerable interference with drones which would not have been the case had the drone equipment been less susceptible to interference. Should future planning develop the necessity for an ARPACAS in future operations, it is concluded that this equipment should be placed on Eniwetok Island near the joint transmitter site where it will cause a minimum of interference. (Ref: Para 5.5.1.)

14.4.8 The drone aircraft remote control equipment suffered from interference from many sources. In order that the more essential drone activity function, it was necessary to silence the ARPACAS, the aircraft homing beacons, AN/TRC back-up circuits, and sonobuoys during operational periods. The drone aircraft themselves, due to faulty ignition bonding and electric wiring in the aircraft, caused some interference to their own operations. It is concluded that the Air Materiel Command should at once undertake to modify the drone remote control equipment by placing it in an UHF band where it is less susceptible to outside interference, and to so modify the circuits as to render the equipment free from interference generated by the aircraft itself. (Ref: Para 4.2.)

14.4.9 Considerable interference with radio reception was occasioned by failure of the using units to meet the specified requirements of Hq, JTF-3, as to suppression of ignition interference and spark interference on motors and vibrators. It is concluded that prior to future operations the J-5 Division should, early in the pre-operational period, institute

interference searches and insure that suppression measures as required are undertaken by the using agency. (Ref: Para 4.2.8.)

14.4.10 The effects of rust on iron and steel are everywhere evidenced at the Eniwetok Atoll where it is particularly vigorous because of the heat, humidity and salt spray. It is concluded that in future antenna and aerial cable construction, consideration be given to a rust-resistant program, either by paint treatment, such as is now being tested at Eniwetok, or by the provision of rust-resistant pole-line hardware and messenger strand. (Ref: Para 11.6.2.4.)

14.4.11 TG 3.1 was provided with military type radio sets by TG 3.2 to meet the communications requirements of scientific groups of TG 3.1 and the Contractor. These sets provided adequate communication with flexibility as to frequency assignment. In the report of CTG 3.1 there appears a recommendation that commercial portable radio equipment be used in lieu of the military tactical radio equipment. This recommendation appears to be based upon the assumption that maintenance parts for commercial sets could be more readily obtained than those for military sets, and that the military supply accountability would not be extended to the commercial equipment. It is believed that these premises are faulty in that spare parts for military equipment are more readily available from depot stocks than are the commercial parts to be procured from the manufacturer, and that no matter whether the equipment be military or commercial, accountability for Government property should not be relinquished. Furthermore, the commercial sets are, in general, not as rugged as the military equipment, and will not withstand the abuse and rough handling under which military equipment will survive. It is therefore concluded that the radio sets used by TG 132.1 should be provided by TG 132.2 and be of the military type, and that TG 132.2 should provide adequate maintenance parts and service.

14.4.12 As a result of the difficulty experienced in maintaining sonobuoys in service, and because of the interference which these sonobuoys caused when in operation, it is concluded that the recommendations of TG 3.3 to the effect that sonar should replace sonobuoys in subsequent operations is valid. (Ref: Para 3.6.3.4.)

14.4.13 In planning communications for operations similar to GREENHOUSE, numerous special electronic equipments are easily overlooked. A discussion of such items is included in Chapter IX of this report.

14.4.14 The USS CURTISS (AV-4) used as a flagship for CTG 3.3 and as a weapons assembly ship for TG 3.1 was equipped with a 100-line ship's service switchboard. During Operation GREENHOUSE this switchboard served 138 phones and there was a requirement for 170 phones. It is recommended that a 200-line switchboard be provided for the flagship of TG 132.3. (Ref: Para 3.6.1.4.)

14.4.15 Crystal grinding facilities employed by TG 3.2 for the benefit of all elements of the Task Force during Operation GREENHOUSE were returned to Hawaii at the request of Hq, USARPAC. Similar equipment should be obtained for future operations. (Ref: Para 3.1.5.3.)

14.4.16 Some means of communications should be provided for all small boats required to operate in remote areas. On several occasions during Operation GREENHOUSE TG 3.3 small boats that were not radio equipped went aground in remote areas of the Atoll and their predicament was not known for several hours. *Very* pistols and/or signal rockets should be provided on all small boats not equipped with radios. (Ref: Para 3.6.2.6.)

14.5 Documents

14.5.1 From experience in Operation GREENHOUSE and as the result of other agencies lacking familiarity with channels for handling traffic to JTF-3, it is concluded that the J-5 Division, JTF-132, should early in the subsequent operations effect wide distribution of traffic routing diagrams and by consultation with the Signal Officers, USARPAC, and Hq, 6th Army, as well as the Communications Officer, CINCPAC, insure an understanding by those headquarters of the message channel facilities of JTF-132.

14.5.2 Considerable difficulty was experienced in Operation GREENHOUSE due to the

use of tactical call signs by elements of JTF–3 for routing traffic external to the Task Force and the lack of familiarity of personnel at relay stations with these call signs when used as routing indicators. It is concluded that the tactical call signs (JANAP 112) should be restricted to use within Task Groups of JTF–132, if used at all. (Ref: Para 4.3.4.)

14.5.3 In view of the lack of knowledge of classification information revealed by members of Hq, JTF–3, which is attributed to the fact that the security classification guide was complex and was given such a security classification as to deny its general use, it is concluded that JTF–132 should provide a simple security classification guide and afford the document the lowest possible classification to insure its wide distribution for general use. (Ref: Para 5.8.1.)

14.5.4 During Operation GREENHOUSE there was evidenced a lack of information on the part of communications center personnel at all levels as to the cryptographic facilities available at various stations. It is concluded that JTF–132 should early promulgate a cryptographic holder's chart and afford it wide distribution to all headquarters which might have a requirement for communicating with the Task Force or any of its elements. (Ref: Para 6.10.1.)

14.6 Practices

14.6.1 In some instances during Operation GREENHOUSE cryptographic systems and instructions relative thereto reached organizations before the equipment necessary for their utilization were received. It is concluded that in connection with future operations, greater care should be exercised to insure that the cryptographic equipment is on hand and ready for operation prior to the receipt of the cryptographic material for the implementation of any cryptographic system. (Ref: Para 6.12.2.)

14.6.2 Liaison officers of JTF–132 should include in their check list of MSTS ships an investigation of the cryptographic facilities available to the ship to insure that these ships are able to communicate with Eniwetok on arrival thereat. Crypto systems should also be issued to remote units such as weather and AFOAT–1 stations prior to the movement of these units to the field. (Ref: Para 6.12.3.)

14.6.3 There was some confusion during Operation GREENHOUSE because of disparity between the communications practices of AEC and those of the military, and it is concluded that in the interest of a smooth functioning integrated communications system, the AEC should conform to military procedures.

14.6.4 During Operation GREENHOUSE there were two on-line teletype conferences and many off-line conferences. On-line conferences require the presence of many personnel who have no particular interest in the matter being handled, and on-line conferences also consume excessive circuit time delaying the passage of normal traffic. Since off-line conferences provide an adequate service which does not interfere with the transaction of normal business, it is concluded that in the conduct of the affairs of JTF–132, all conferences should be of the off-line type. (Ref: Para 6.8.)

14.6.5 The EFM (Expeditionary Force Messages) proved such a boon to morale at Eniwetok, without impairing security, that it is concluded that the practice of having this service available to the personnel should be continued by JTF–132 during subsequent operations.

14.6.6 Instructions were promulgated by Hq, JTF–3, as to the handling of urgent telephone calls. However, considerable confusion was evidenced due to a lack of understanding on the part of the operators and of those utilizing the service. It is therefore concluded that the operators and the staff personnel of JTF–132 should be educated in the use of urgent telephone traffic procedures. (Ref: Para 3.1.2.6.)

14.6.7 The nature of the message traffic generated by JTF–3 indicated a lack of understanding on the part of the staff on the elements of message preparation and handling. It is therefore concluded that there should be staff orientation conducted by JTF–132 on the subject of message preparation and communications procedures in order to reduce the length of messages, to insure proper classifi-

cation and security, and to reduce the number of types of messages which require special handling. (Ref: Para 5.11.4.)

14.6.8 The wide variety of types of message traffic generated by JTF-3 gives rise to the conclusion that greater efficiency of communications would result from an effort to minimize the number of types of traffic. (Ref: Para 8.5.)

14.6.9 From a consideration of the plans of roll-up utilized by JTF-3, it is concluded that JTF-132 should study quality of the results achieved, with a view to determining in what respect they can be improved. (Ref: Para 12.4.)

14.6.10 At the conclusion of Operation GREENHOUSE there was revealed a lack of understanding of supply procedures by the personnel of TG 3.1. It is concluded that steps should be taken by JTF-132 to insure a complete understanding by all Task Groups and Task Units thereof as to the details of operation of the supply system and the enforcement of supply discipline. (Ref: Para 11.4.)

14.6.11 In preparation for Operation GREENHOUSE the J-5 Division placed requisitions directly upon the Chief Signal Officer in an effort to reduce to about 60 days the normal pipe-line time of 120 days on supply matters. This procedure imposed considerable strain upon supply systems, and in some instances, defeated its own purposes by causing supplies to reach transfer points which had not been advised of their expected arrival. It is concluded that in spite of the long pipeline delay time, JTF-132 should require its requisitions to originate with each of the task groups, with the possible exception of requisitions for Signal Corps plant extensions, which are normally handled by the Plant Engineering Agency of the Office of the Chief Signal Officer.

14.6.12 In view of the difficulty experienced in finding appropriate photographs for use in connection with the preparation of the communications report of Operation GREENHOUSE, it is concluded that the J-5 Division, JTF-132, should inaugurate a continuing program of photography to illustrate all elements of the communications activities of subsequent operations.

14.6.13 During emergencies which might arise at Eniwetok Atoll during subsequent operations, it would be advisable for JTF-132 to be able to communicate with all military establishments within a 700 mile radius of the Eniwetok Atoll. It is concluded that for future operations radio circuits should be established to all U.S. Stations within that area.

14.6.14 In order that the J-5 Division could have a complete understanding of the communications requirements of all elements of the Task Force, it is concluded that the J-5 Division, JTF-132, should establish contact with all scientific elements of TG 132.1. (Ref: Para 7.1.)

14.6.15 Radio equipped boats of the H&N and TG 3.3 boat pools were not assigned a common frequency for inter-communications. It is recommended that the Frequency Plan of JTF-132 include a frequency common to all radio equipped small boats. (Ref: Para 3.6.2.5.)

14.6.16 From an emergency standpoint and to allow the Naval Task Group to pass administrative and logistics traffic, not involving Joint Task Force policy matters, direct, there is a definite requirement for a circuit between the Naval Task Group Commander and a shore radio station in the Navy Teletypewriter System. A direct radio teletype circuit between the flagship, Naval Task Group, and Navy Radio Kwajalein is recommended during future operations at Eniwetok. (Ref: Para 3.6.13.8.)

14.6.17 Based upon the almost total absence of adverse comment and the commendatory remarks of the Task Force Commander and his Chief of Staff, it is believed that the general system of communications for Operation GREENHOUSE was efficient and satisfactory. The shortcomings of the system are emphasized in the foregoing pages and steps leading to their correction have been indicated. It is concluded that if subsequent operations at the Eniwetok Atoll Proving Grounds are conducted with substantially the same organization as that of JTF-3, the communications system and practices of JTF-132 should be similar to those for Operation GREENHOUSE with the minor changes herein proposed.

Appendix I

Annex "F"
In 28 pages

FINAL REVISION

OF

ANNEX "F"

TO

FIELD ORDER NO. 2 (REVISED)

COMMUNICATION

This Annex supersedes Annex "F" to Field Order No. 2 (Revised), dated 22 January 1951, which should be removed and destroyed in accordance with AF Regulation 205-1, dated 14 March 1949. Appendices I thru X, inclusive, to Annex "F" to Field Order No. 2 (Revised) are not changed and will become a part of this Document.

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Annex "F" to Field Order No. 2 (Revised)

COMMUNICATION

HEADQUARTERS, JOINT TASK FORCE THREE
Washington 25, D. C.
20 April 1951

1. GENERAL

a. The purpose of this document is to set forth in one publication the mission, facilities and organization for providing communications for Joint Task Force THREE in Operation GREENHOUSE, and for the normal and operational communications required for the semi-permanent Atomic Weapons Proving Ground at Eniwetok Atoll. The contents of communication annexes to operation orders issued for any particular phase of the operation will be reduced to information and instructions essential to supplement or modify the instructions contained herein.

b. Eniwetok Atoll is an island group of the Marshall Islands, the principal island being Eniwetok, located at about latitude 11°25′N and longitude 162°20′E.

c. This atoll, originally belonging to Germany, was mandated to Japan after World War I. In World War II, the atoll was captured from the Japanese and became a U.S. Force's base.

d. Operation SANDSTONE, an atomic weapons test conducted at Eniwetok Atoll in 1948, was a ship-based joint operation conducted by Joint Task Force SEVEN, the Army and Air Force Task Groups being ashore on Eniwetok and Kwajalein, respectively.

e. Joint Task Force THREE, under command of Lieutenant General E. R. Quesada, is land-based on Eniwetok Atoll. Headquarters will be established on Parry Island. Operation GREENHOUSE will be conducted by Joint Task Force THREE. The Scientific Task Group (TG 3.1), also based on Parry Island, will conduct the scientific tests. The Army Task Group (TG 3.2), based on Eniwetok, will provide land based support to include guard, security, logistical support, certain communications and other base facilities as required. The Navy Task Group (TG 3.3), with headquarters aboard the U.S.S. CURTISS (AV-4), will provide naval support. The Air Task Group (TG 3.4), will provide air support for tactical, administrative and scientific missions from its headquarters on Eniwetok.

f. The Atomic Energy Commission, through the J-Division (University of California), has contracted with Holmes and Narver, Engineers of Los Angeles, for all engineering and materials to be utilized in the construction of a semi-permanent proving grounds at Eniwetok Atoll. With respect to communications: the inter-island cables, local cables, telephone switchboards, instrumentation equipment, and in general, all telephone equipment will be provided by Holmes and Narver. In addition this contractor will provide certain operational services for such facilities when installed. On Eniwetok Island, however, communications are a responsibility of the armed services, with TG 3.2 providing all facilities except those peculiar to the Navy and Air Force.

g. Communications facilities for Operation GREENHOUSE will be installed with a view to being maintained during caretaker status periods in such a manner that they can be returned to service and operated with a minimum of advance notice, personnel and expense.

2. MISSION OF THE J-5 DIVISION, HEADQUARTERS JOINT TASK FORCE THREE

a. The Assistant Chief of Staff, J-5, JTF-3, will be responsible for overall engineering, planning, installation and operational control of Hqs, JTF-3 communications facilities (see b (3) below) and for coordination and approval of communications plans of all subordinate task groups.

b. Specifically, the approved missions of the J-5 Division, JTF-3, are:

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(1) Prepare plans and establish policies for the installation and operation of the overall communications system for the Task Force.

(2) Determine requirements and initiate procurement of personnel and equipment necessary to provide for the Hqs, JTF-3 and TG 3.2 communications facilities.

(3) Exercise operational control over the JTF-3 (Parry Island) communications center, and over the off-island radio facilities, the radio monitoring facilities, and the crystal grinding facilities installed on Eniwetok Island whenever Hqs, JTF-3, is operating in the forward area. (The facilities enumerated herein shall be known as JTF-3 Communications Facilities throughout this Document.)

(4) Prepare general plans for and maintain operational control of inter-island communications required in the event of failure of the submarine cable system.

(5) Plan and supervise communications security measures and projects, including cryptography for the Task Force.

(6) Procure, assign and control frequencies and call signs for all elements of the Task Force.

(7) Make assignments of all full-time wire circuits.

(8) Coordinate communications plans of task groups and monitor their execution.

3. JOINT TASK FORCE THREE HEADQUARTERS COMMUNICATIONS OFFICE ORGANIZATION (See Appendix I, Organizational Chart, J-5 Division, Hqs, JTF-3).

a. The Task Force Communications Office (J-5 Division) will be manned by the Assistant Chief of Staff, J-5, and a minimum of one commissioned assistant from each of the armed services. The Assistant Chief of Staff, J-5, is responsible for the communications mission. The senior assistant will be the deputy. One assistant, the chief of the Traffic Operating Section, will serve as officer-in-charge of the JTF-3 Communications Center when in the forward area, in addition to his staff duties. One assistant will be responsible for circuit and frequency assignments and one for logistics, personnel and administrative. Four (4) officers, one (1) civilian and eight (8) enlisted men will comprise the Communications Security Section. An electronics engineer will act as Technical Adviser and consultant. The office force will consist of a chief clerk, a civilian stenographer and two (2) enlisted stenographers. The communications Division (J-5), less the civilian stenographer, will move to the Forward Area with Hq, JTF-3.

b. In addition to the above a communications center for Hq, JTF-3 (Washington), in Temporary Building "U", Washington, D. C., will be operated by a detachment of six (6) enlisted men, under the supervision of an officer assigned to the J-5 Division, Hq, JTF-3. The civilian stenographer will remain with the Communications Center Detachment whenever Hqs, JTF-3, is in the Forward Area.

4. JOINT TASK FORCE THREE COMMUNICATIONS SERVICE

a. Communications Center

A communications center will be established on Parry Island for the purpose of handling off-island radio and radio-teletype traffic for Hqs, JTF-3, and subordinate Task Groups during Operation GREENHOUSE. Normally, TG 3.1 will be served from the JTF-3 Communications Center, by messengers to be supplied by TG 3.1. Task Groups 3.2, TG 3.3 and TG 3.4 will be served from the JTF-3 Communications Center by means of electrical transmission facilities. TG 3.2 will establish on Eniwetok Island a communications center with facilities essentially duplicating those in the JTF-3 communications center. TG 3.3 will establish aboard the USS CURTISS (AV-4), a communications center for handling TG 3.3 traffic and traffic for weapons assembly teams of TG 3.1. TG 3.4 will establish a communications center, less crypto room, on Eniwetok Island. Cryptographic work for TG 3.4 will be performedd by TG 3.2.

b. Messenger Service

Within Hqs, JTF-3, messenger service will be provided by the Adjutant General's Section.

[redacted]

c. Teletype Conference Service

A teletype conference facility will be established on Parry Island in conjunction with the Hqs, JTF–3 Communications Center. This service will provide classified teletype conferences between Eniwetok Atoll and Los Alamos, USARPAC and Washington, D. C.

d. Radio Service

Transmitting and receiving facilities to provide direct radio teletype circuits to USARPAC, Hawaii; to Rear Echelon, TG 3.1 at Los Alamos, New Mexico. Transmitting and receiving equipment for these facilities will be located on Eniwetok Island remotely controlled from the JTF–3 Communications Center via submarine cable pairs backed up by VHF radio keying circuits. Traffic to the Hqs, JTF–3 (Washington), and the Department of Defense in Washington, D. C., or to other domestic points will be relayed through USARPAC via ACAN circuits or through Los Alamos, via ACAN or commercial teletypewriter circuits. A CW circuit to Kwajalein (P33) will be provided.

e. Telephone Service (See Schematic Diagram, Appendix II)

Telephone service for JTF–3 will consist of common battery switchboards installed on Eniwetok, Parry and certain other islands, interconnecting Hqs, JTF–3, the various task groups and scientific test sites by means of land-lines, and inter-island submarine and buoy cables the links of which will be backed up by radio telephone and teletype facilities. Task Group 3.1 will be responsible for installation, operation and maintenance of the telephone plant on Parry and other islands to the north and for the submarine cable system, and in addition for the publication of a complete Atoll telephone directory. TG 3.2 will be responsible for installation, operation and maintenance of the local telephone plant on Eniwetok Island.

f. Cryptographic Service (See Crypto Holders Chart, Appendix III)

One-time tape systems have been selected as the primary means of cryptography for Operation GREENHOUSE when only one addressee is involved. This system lends itself to secure and semi-automatic operation which conserves personnel and expedites transmission and delivery. Other cryptographic systems for multiple address messages will be issued to elements of JTF–3 as required by Army Security Agency, Hawaii.

g. Communications Equipment Repairs

The Signal Officer, Task Group 3.2 will establish and operate a repair service for the maintenance of all fixed administrative communications facilities serving JTF–3. A secondary mission of this facility will be the maintenance of special services radio equipment and to provide assistance to other task group communications officers in the maintenance of tactical electronic communications equipment. Personal radio receivers may be repaired providing facilities are available and no expense to the government is involved. No government stocks will be utilized in the repair of privately owned sets.

h. Communications Supply

Communications supply for Hqs, JTF–3, and all other elements of the task force with the exception of items peculiar to the Air Force, Navy and Scientific Groups will be stored and issued by the Signal Officer, TG 3.2. The requisitioning of fixed plant items and maintenance supplies will be the responsibility of the respective task group communications officers.

i. Emergency Personal Message Service

For details of this service see the Personnel Annex of Administrative Order No. 2 (Revised), Hqs, JTF–3.

j. Special Communications Requirements

Special communications requirements shall be submitted to Hqs, JTF–3, for approval. Hqs, JTF–3, will establish equipment requirements, assign requisitioning, installation, maintenance and operation responsibilities. This will permit agencies assigned specific tasks to insure adequacy of personnel to accomplish the task and permit normal supply action to be taken.

5. JOINT TASK FORCE THREE COMMUNICATIONS OPERATING PROCEDURES

a. General

(1) The principles of joint communications and the policies and procedures outlined in applicable Joint Army, Navy, Air Force publications (JANAP'S) will be used by all elements of this Joint Task Force.

(2) Communications instructions of a general nature are contained in Joint Communications Instructions, Part I, General, JANAP 121 and will be used for inter/intra-service signal communications.

b. Circuit Assignment

The assignment of pairs in all inter-island cables and the allocation of pairs in all local cables is a function of the J–5 Division. Task group commanders will submit for approval and assignment telephone, teletype and radio circuit requirements with justification in each case. (See Appendix VII, Frequency Plan and Circuit Assignment Chart; also Appendix X, Wire Circuit Assignments.)

c. Circuit Diagrams

Up-to-date diagrams of radio and teletype circuits serving JTF–3 will be maintained by the J–5 Division, JTF–3. The Communications Officer, TG 3.2, will prepare and maintain copies of cable records and line record cards for the telephone plant on Eniwetok Island. The Communications Officer TG 3.1 will prepare and maintain cable records and line record cards for the telephone plant on Parry Island, and islands to the north thereof, and for the submarine cable system. Task Group communications officers will provide the J–5 Division, JTF–3, with cable charts and equipment layout diagrams including subsequent changes of all communications circuits and facilities.

d. Radio Procedures

(1) Frequency assignment and control. (See Appendix VII, Frequency Plan and Circuit Assignment Chart.)

(a) Assignment of radio frequencies within JTF–3 will be made by the Frequency Control and Circuit Section, J–5, JTF–3. Task Group Commanders will submit frequency requirements by 1 November 1950 indicating:

Purpose
Distance to be covered
Location of Transmitter or transmitters
Type of emission
Power to be utilized
Type or nomenclature of equipment to be used
Frequency coverage of transmitter to be used
Approximate or desired frequencies

(b) Task group commanders will requisition crystals for approved frequencies through normal supply channels to meet operational requirements.

(c) All units will make every possible effort to accurately calibrate and maintain the frequency stability of communications and electronic equipment.

(d) All radio circuits will be monitored for accuracy by Hq, JTF–3, to prevent interference or unauthorized transmissions. Frequency interferences noted will be reported to Hqs, JTF–3, through TG channels, for appropriate action.

(2) Call Signs, Address Groups and Routing Indicator Assignments. (See Appendix IV.)

(a) In order to effect coordinated assignment, Task Group Commanders will submit requirements for call signs, address groups and routing indicators to Hqs, JTF–3.

(b) Radio call signs for elements of JTF–3 are published in Appendix IV. Voice call signs from "B", Fleet list Sec. 8 JANAP 119 (A) have been approved for use by JTF–3 and may be employed by Task Group Commanders without reference to JTF–3.

(3) Operating Signals and Pro-Signs.

(a) Operating signals are contained in JANAP 131. Pro-Signs are contained in the applicable procedure publications and in JANAP 123, Part III, General.

(b) Operating signals and pro-signs as contained in the above publications will be used for inter/intra service communications operations.

(4) Radiotelephone Procedure.
Radio telephone procedure as outlined in JANAP 125 will be used within JTF–3 for inter/intra service radiotelephone operations on all voice circuits.

(5) Radio Telegraph Procedure
Radio telegraph procedure is outlined in JANAP 124 and will be used within JTF–3 for inter/intra service CW radio operations.

(6) Direction-Finding Procedure
Direction-finding procedure as outlined in JANAP 130 will be used by elements of JTF–3.

(7) Noise Suppression.

(a) All equipment and devices generating radio frequency interference will be suppressed to a point of non-interference with electronic equipment used in Operation GREENHOUSE.

(b) Motor vehicles, power units, air compressors, refrigeration plants, motor boats, aircraft ignition systems and other types of spark generating devices are types of equipment which will radiate noise interference if shielding, bondings, suppressors and capacitors are not properly installed.

(c) Each task group commander of JTF–3 will be responsible for the suppression of interfering noises being generated from such equipment and will take the necessary steps to reduce interfering noises to a minimum.

e. Communications Security

(1) Communications Security will be in accordance with JANAP 122 and this Communication Annex.

(2) The J-5 Division, Hqs, JTF–3, will plan and implement communications security measures to prevent the revelation through communications of classified information pertaining to JTF–3 during the conduct of Operation GREENHOUSE. (See Appendix V for Communications Security.)

(3) The Eniwetok Atoll landline and submarine cable telephone and telegraph system is approved for "Secret" matter. However messenger, and personal visits are to be preferred. "Top Secret" and AEC "Restricted Data" will *not* be discussed over the Atoll Telephone system, nor in unenciphered message traffic.

(4) In the event that the inter-island cable circuits fail, inter-island back up radio-telephone and teletype circuits will *not* be used to pass classified traffic in the clear. When radio back-up is used the telephone operator will, in each instance, advise the subscriber that a radio circuit is being used. A distinctive tone signal will be heard.

(5) The use of voice radio nets for the discussion of classified information is prohibited. All messages transmitted via radio telephone will be as concise as is practical consistent with clarity.

(6) Radio nets not specifically authorized by Hqs, JTF–3, will not be established. Radio and radar silence will be adhered to when ordered by JTF–3.

f. Cryptographic Security

(1) The provision of JANAP 122 will govern in all matters pertaining to cryptographic security within JTF–3.

(2) Personnel who hold a cryptographic clearance will be the only personnel authorized to work in the crypto center of the various Task Groups. A list will be posted on the door of each crypto center showing name and title of all personnel authorized to visit the crypto center, other than those assigned to duty therein. A visitor's log will be maintained at each crypto center showing time in and out, purpose and authority for each visit made by other than regularly assigned personnel.

(3) Destruction material will be kept on hand at each crypto center and each communications officer having a crypto center under his jurisdiction will insure compliance with emer-

gency destruction provisions of documents pertaining to cryptographic material held. All assigned cryptographic personnel will be familiar with the plan for the destruction of this material.

(4) When capture by the enemy is imminent, messages, extracts from communications plans, SOP's and all classified documents and equipment, including cryptographic devices, will be thoroughly and completely destroyed beyond recognition. Loss or compromise of any item of SOP, code book, cipher list or other material which might be of value to the enemy or compromise any JTF–3 Communications will be reported at once in accordance with JANAP 122.

g. Transmission of AEC "Restricted Data"

The only cryptographic systems approved for encipherment of AEC "Restricted Data" are one-time systems, the terminals of which are operated by "Q" cleared personnel.

h. Telephone Switchboard Operating Procedure

(1) JANAP 134 will be used within JTF–3 for all telephone switchboard operations.

(2) The telephone operator will give prompt attention to Priority and Redline calls, using "Brĕak-in" procedure on calls in progress if necessary to complete the desired connection. Details of this procedure will be included in the Atoll Telephone Directory. When a voice radio circuit is used, the operator will in each instance advise the subscribers "This is a radio circuit—Watch your Security."

i. Communication Center Procedure

(1) Message preparation. The provisions of JANAP 121 will be followed within JTF–3 in the preparation of all messages. All organizations under this command will procure and have readily available JANAP 121 or extracts therefrom, for the information and guidance of message writers. Extracts of that portion of JANAP 121 on message preparation is authorized.

(2) Message precedence. Precedence of all messages will conform to the provisions of JANAP 121. The lowest precedence consistent with the contents of the message will be used at all times.

(3) Teletype and tape relay procedure. The provisions of JANAP 127 will be used by all units of JTF–3 for inter/intra-service teletype operations to include local teletype nets. In the transmission of classified traffic in plain text over approved circuits, channel checks will be considered adequate station to station receipts; however, internal handling of classified messages will be in accordance with current directives on the handling of classified matter.

(4) Teletype conference procedure. Armed Forces Security Agency Document 1229 (AFSAG 1229) prescribes teletypewriter conference procedure and will be followed within JTF–3 on teletype conference facilities. Units with conference facilities not holding AFSAG 1229 will make provisions to secure same.

(5) Crypto device and machine operation. Detailed instructions for the operation of the various cryptographic machines and devices are contained in the following publications:

Device or machine	*Publication*
CSP 2900	AFSAG 1202 and 1205
ASAM 1	ASAM 1/1
ASAM 5	ASAM 5/1
CCM	ASAM 5/1
One-Time Pad	ASAL 1/1
CSP 845	ASAS 1/1
ASAM 2–1	ASAM 2–1/1 Normal Operation
	ASAM 2–1/3 One-Time Operation
SIGTOT	AFSAG 1229
ASAM 12	ASAM 12/1
M–209	TM 11–380

j. All incoming messages will be edited and prepared on master Ditto stencils before release to the Adjutant General's Section.

k. Authentication

(1) Under the direction of the Assistant Chief of Staff, J–5, JTF–3, TG 3.2, will be responsible for publication and distribution of the JTF–3 Authentication System. Compilation will be in accordance with authentication system No. 8 of Joint Authentication System Document JSC 100. This authentication system will be used for both radio and wire circuits. Other authentication systems peculiar to a particular phase of communications or activity may be used at the discretion of task group commanders and with the approval of Hqs, JTF–3.

(2) Authentication is mandatory under the following circumstances:

(a) Whenever any station suspects imitative deception on a circuit, the suspected station will be required to authenticate.

(b) Any station challenged or requested to authenticate must comply. This shall not be interpreted as requiring stations to break radio silence for the sole purpose of completing authentication.

(c) Contact and amplifying reports.

(d) Transmissions directing the setting of a condition of radio silence or requiring a station to break an imposed radio silence.

(3) Authentication is advisable under the following circumstances:

(a) When transmitting operating instructions which affect the military situation.

(b) When making initial radio contact, to prevent an unauthorized station from opening a circuit or entering a net.

(c) When transmitting to a station which is maintaining radio silence.

(4) Authentication may also be required under conditions of circumstances as set forth by local commanders.

l. Recognition and Identification Instructions.

(1) JANAP's 150 through 154 encompass the field of Recognition and Identification. Task Groups 3.2, 3.3, and 3.4 will make provisions for the procurement and use of subject JANAP's as deemed necessary by the respective TG commanders.

(2) Task Groups 3.3 and 3.4 will be responsible for effecting and coordinating Recognition and Identification procedures, including IFF, of surface vessels and aircraft within the Eniwetok Area. Restrictive measures on IFF will be promulgated from Hqs, JTF–3, in the communication annexes to operation orders.

m. Emergency Rescue Communications Procedure

Emergency rescue communications procedure is prescribed in JANAP 107 and will be used within JTF–3 for inter/intra-service emergency rescue communications.

n. Standard Time Broadcasting

(1) The National Bureau of Standards, as a public service, continuously transmits standard frequency and time signals over station WWV, Washington, D. C. Listed below are the transmission and audio tone frequencies.

Transmission Frequency in Mcs	*Audio Frequency in cycle*
2.5	1 and 440
5.	1 and 440
10.	1, 440 and 4000
15.	1, 440 and 4000
20.	1, 440 and 4000
25.	1, 440 and 4000
30.	1 and 440
35.	1

(2) A 0.005 second pulse may be heard as a faint tick every second, except the 59th second of each minute. These pulses may be used for accurate time signals. The time interval marked by the pulse each second is accurate to 0.000001 second.

(3) The audio transmissions are interrupted for one (1) minute before each hour and for each five (5) minutes thereafter, i.e., 59th minute, 4th minute after the hour; 9th minute after the hour, etc. This one minute interval also affords time for radio-frequency measurements without the presence of audio tone transmissions. The station's services and identification are given by voice transmissions on the hour and half-hour.

(4) The facilities described herein will be utilized by communications officers for periodic checking of time indicators and frequency meters.

o. Visual Signaling (V/S) Procedure

(1) Visual communications within Task Group 3.2 will be governed by FM 24–22.

(2) Visual communications within Task Group 3.3 will be in accordance with USF 70 (B) and any special directives issued by CINCPACFLT.

(3) Visual communications within Task Group 3.4 will be governed by CCBP–8 and current Air Force Directives.

6. JOINT TASK FORCE THREE COMMUNICATIONS OPERATING PERSONNEL

a. Task Group 3.1, through the AEC contractor, Holmes & Narver, Engineers, will engineer, install, operate and maintain the telephone systems on all islands with the exception of Eniwetok Island and will also engineer, install, operate and maintain the inter-island and buoy submarine cable system. Task Group 3.1 will publish the telephone directory of the Eniwetok Atoll. The AEC will operate the Los Alamos Terminal of the Eniwetok-Los Alamos radio teletype circuit.

b. Personnel of Task Group 3.2 will install, operate and maintain the telephone system on Eniwetok Island, install, operate and maintain radio teletype circuits to USARPAC and Los Alamos, the equipment for the JTF–3 communications center on Parry Island, the radio telephone and carrier equipment for inter-island and ship-to-shore back-up circuits, and will engineer, install, operate, and maintain the TG 3.2 communications center on Eniwetok Island, and such other communications facilities as may be required by JTF–3 or TG 3.2.

c. Task Group 3.3 will engineer, install, operate, and maintain the TG 3.3 communications center on the USS CURTISS (AV–4).

d. Task Group 3.4 will engineer, install, operate, and maintain the TG 3.4 radio communications.

7. JOINT TASK FORCE THREE COMMUNICATIONS FOR EMERGENCY EVACUATION

a. In case of emergency evacuation of the Eniwetok Atoll prior to completion of Operation GREENHOUSE, JTF–3 communications facilities will continue to be manned by personnel of the 7127th AU Communications Detachment as long as required to support the evacuation and/or defense of the Atoll. On order to evacuate JTF–3 will relinquish operational control of JTF–3 communications facilities to TG 3.2.

b. CTG 3.3 will provide the necessary shipboard communications required to support the evacuation.

8. TASK GROUP 3.1 COMMUNICATIONS MISSION

The communications mission of the Task Group 3.1 includes:

a. Coordinating the communication requirements of the scientific programs with JTF–3.

b. Engineering, installing, operating, and maintaining the inter-island submarine and buoy cable system, and telephone facilities on the islands other than Eniwetok.

c. Installation, operation, and maintenance of the ZI terminal of the Eniwetok-Los Alamos radioteletype circuit.

d. Editing and publishing the Atoll Telephone Directory.

e. Installation, operation, and maintenance of special scientific electronic equipment.

f. Installation, operation, and maintenance, with the assistance of TG 3.2, of tactical radio equipment required for use of the scientific contractors.

9. TASK GROUP 3.1 COMMUNICATIONS SERVICES

a. Telephone Service.

Exchange telephone service will be provided to subscribers of telephone exchanges on sites "B", "C", "D", and "E", inter-connecting land lines and inter-island and buoy cable systems.

b. Signal Cable.

A signal and control cable system will be provided, connecting the control station, Site "B", with sites "C", "D", "E", "F", "K", "S", "T", "J", and "U". Special circuit signal and telephone cables will be installed on the islands as required for the use of the scientific programs.

c. Radio Service

Radio transmitting and receiving facilities at the communications center at Los Alamos, New Mexico, will provide a direct radio circuit to Eniwetok and message relay service to domestic points.

d. Telemetering

Telemetering and control facilities are provided by special electronic equipment developed for the scientific programs and the necessary information is transmitted by radio or wire circuits to the point of recording or control.

e. Time Signals

Voice time and warning signals will be broadcast from the control station on Parry, when directed by the Commander, JTF–3. Time signals for operation of the scientific equipment will be furnished as required.

f. Directory Service

An Atoll Telephone Directory will be published listing telephone numbers of principal personnel and organizations.

10. TASK GROUP 3.1 COMMUNICATIONS FACILITIES

a. Telephone Exchange

The telephone switchboards are common battery units. The Parry switchboard is a two (2) position, non-multiple with 220 subscriber, and 30 trunks. Those on Runit, Rojoa, and Engebi have one position and facilities for 45 subscribers and 12 trunks. The exchanges serve other than local subscribers; Parry serves Japtan; Runit serves cable buoy #2 and Site "M"; Rojoa serves Biijiri, Aoman, Eberiru, Aaraanbiru, Piiraai and cable buoy #3; Engebi serves Muzin, Teiteiripucchi, Bogallua and cable buoy #4.

b. Cable Plant

The inter-island telephone cable system consists of three 16 pair, #19AWG, armored submarine cables between Parry and Eniwetok and two similar cables between other principal islands. A secondary distribution system from an exchange to certain adjacent islands and to cable buoys is 6 pair cable of the same type. Loading, terminating points, including cable buoy locations, and length of cable runs are shown on sketch, Appendix II.

c. Tactical Radio

Tactical military radio communications equipment will be provided to furnish communications within the atoll where telephone service is not available or not suitable for the service required. These radio nets will be in accordance with plans submitted to Hqs, JTF–3, for approval.

d. Maintenance Shop

A communications maintenance shop under the supervision of TG 3.1, operated by Holmes & Narver will be available on Parry Island for the scientific program communications.

11. TASK GROUP 3.1 COMMUNICATIONS PERSONNEL

a. The contractor will provide personnel to engineer, install, maintain and operate the Atoll telephone system, except for the telephone and cable plant on Eniwetok Island. The contractor will provide personnel to install, and operate military radio equipment in small boats and vehicles as required by TG 3.1, and will maintain this equipment with the assistance of TG 3.2.

b. Special electronic equipment used by the scientific programs for scientific tests will be installed, maintained and operated by user personnel with the assistance of the applicable Task Group maintenance personnel.

c. The communications facilities at Los Alamos will be installed, operated and maintained by AEC personnel.

[redacted]

d. The radio communications nets of the scientific program will be operated by personnel of the using Task Group.

12. TASK GROUP 3.1 COMMUNICATIONS FOR EMERGENCY EVACUATION

a. The Task Group 3.1 will provide communications for emergency evacuation by means of:

(1) The Atoll telephone system;
(2) Boat pool radio net; and
(3) Scientific program radio nets.

b. Should an emergency evacuation become necessary as a result of enemy action and it appears that capture of equipment is imminent, all classified documents and devices will be destroyed in accordance with applicable regulations. All other communications equipment which cannot be evacuated will be rendered unfit for further use or repair in accordance with applicable Technical manuals.

13. TASK GROUP 3.1 COMMUNICATION FACILITIES ROLL-UP

a. Signal supply items, fixed station, and tactical communications equipments held on memorandum receipt by TG 3.1 and not required after completion of Operation GREENHOUSE will be returned to the issuing agency.

b. Any of the above material required by AEC at Los Alamos for operation of the direct Eniwetok-Los Alamos circuit or on Eniwetok during the caretaker status of the atoll will be invoiced to the AEC property officer at Los Alamos.

c. The tentative plan is to tropically pack the switchboards and associated equipment now on Engebi, Rojoa, and Runit and store same in a warehouse on Parry. It is anticipated that the switchboard on Parry Island will continue to be operated by AEC caretaker personnel.

14. TASK GROUP 3.2 COMMUNICATIONS MISSION

The communications mission of the Army Task Group includes:

a. Installation, operation and maintenance of essential communications facilities for Hqs, JTF-3, with the exception of telephone plant on island other than Eniwetok and the inter-island and buoy cable system.

b. Installation, operation and maintenance of a radio monitoring facility.

c. Installation, operation and maintenance of a crystal grinding and checking facility.

d. Equip, maintain and operate a van-mounted facility consisting of an AN/TRC-1, CF-1A and EE-101 equipment for use as required by Hq, JTF-3, as a telephone back-up for the inter-island cable system between Eniwetok Island and the island to which cable is defective, or as otherwise required.

NOTE: The above mentioned communications facilities will be known as Hqs, JTF-3, communications facilities and will be under the operational control of JTF-3 whenever Hqs, JTF-3, is operating in the forward area, or as otherwise directed.

e. Internal TG 3.2 communications, including guard and boat pool radio nets; and all local telephone service on Eniwetok Island. A two (2) position 220 subscriber, 30 trunk line switchboard will be utilized. This is a duplicate of the switchboard on Parry Island, and is to be furnished by the AEC.

f. Establish and operate a facility to provide maintenance for all tactical communications equipment serving JTF-3, and TG 3.2. This facility will also install and maintain special Service radio equipment and assist other Task Groups in the maintenance of tactical electronic equipment.

g. Operate a battery charging plant for the maintenance of storage batteries.

h. Operation of a signal warehouse for the storage and issue of communications equipment and supplies required for the installation and maintenance of communication facilities for JTF-3 and TG 3.2. Logistic support for JTF-3 communications will be through the Overseas Supply Division, SFPOE.

i. Publish an Eniwetok telephone directory when required and supply information to TG 3.1 for inclusion in the ATOLL Telephone Directory.

j. Installation, operation and maintenance of a MARS amateur radio station under supervision of Hqs, JTF-3, for the purpose of passing cleared CW traffic only.

k. Guard the International distress frequency (500Kc) except when relieved of this responsibility by JTF-3.

[redacted]

15. TASK GROUP 3.2 COMMUNICATIONS SERVICES

a. Communications Center

A communications center providing normal communications center services will be established and operated as an adjunct to the JTF–3 Communications Center. In addition this communications center will provide cryptographic services for TG 3.4.

b. Telephone Service

(1) Telephone service will be provided to subscribers in TG 3.2 and TG 3.4 through the telephone exchange on Eniwetok. The exchange will be connected to the Atoll telephone system for Atoll service.

(2) Directory service will be provided until the Atoll directory is published by TG 3.1. Records for the compilation of the Atoll directory will be furnished TG 3.1.

c. Radio Service

Radio transmitting and receiving facilities will be provided for ship-shore CW and radio telephone requirements. In addition such services as small boat, G–2 sweep missions and tactical radio communications facilities will be made available as required.

16. TASK GROUP 3.2 COMMUNICATIONS FACILITIES

a. *Communications Center, Headquarters; Joint Task Force THREE.*

The Communications Center, Hqs, JTF–3, will be located in Headquarters Building (#221) on Parry Island and will consist of a message center, teletype room and crypto vault. The equipment will be located therein as shown on Chart 1, Appendix VI, and will be installed in compliance with accepted practices. Provision shall be made for adequate back-up power.

b. *Communications Center, Headquarters, Task Group 3.2.*

The Communications Center, TG 3.2, will be located in Building #15 in space designed for the purpose and will consist of a message center, teletype room, telephone exchange and crypto vault. Provision shall be made for adequate back-up power. (See Chart 2, Appendix VI.)

c. *Radio Receiver Building (Chart 3, Appendix VI).*

(1) Monitoring Room: In the monitoring room there shall be installed adequate receivers of proper type to monitor all channels and frequencies used in Operation GREENHOUSE. Provision will be made for feeding the output of the receivers to either oscilloscopes or magnetic tape recorders in addition to head sets and loud speakers. (Under JTF–3 operational control.)

(2) Receiver Room: In the receiver room there shall be diversity receivers for the Los Alamos and USARPAC circuits and receivers for all other circuits as well as radio control facilities. There shall be teletype circuits for communication to TG 3.2 Communications Center and to the JTF–3 Communications Center. There shall also be CW operating positions, to include receivers and essential keying circuits, and a teletype circuit to the Communications Center. (Under JTF–3 Operational Control.)

(3) Crystal Shop: The crystal shop shall be equipped to measure the frequency of all crystals for JTF–3 radio equipment and to grind crystals when required. (Under JTF–3 Operational Control.)

(4) Maintenance Shop: The purpose of the maintenance shop in the Receiver Building is to provide maintenance for the equipment installed in the Receiver Building.

(5) Provision shall be made for adequate back-up power.

d. *Battery Charging Plant:* The battery charging plant in Bldg. #84 will be equipped for the purpose of charging and maintaining storage batteries used for radio sets and emergency power units. This building will also house emergency power units to serve activities in the Receiver Building.

e. *Signal Warehouse:* The signal warehouse will be used for storage of equipment, reserve units, spare parts and expendable items until required for issue to users.

f. *Joint Radio Transmitter Building.* (Chart 4, Appendix VI.)

The Joint radio transmitter building shall house the radio transmitters comprising the JTF–3 facilities. (Under JTF–3 operational control.) In addition certain AACS transmitters will be installed therein. The maintenance shop in this building is for maintenance of the installed equipment. Provision shall be made for adequate back-up power.

g. *Telephone Exchange—Eniwetok:* The equipment and supplies, including spare parts, for the telephone exchange installation at Eniwetok will be furnished in so far as possible by Holmes & Narver, Engineers, but may be augmented from military stocks as required.

h. *Telephone Cable Plant—Eniwetok:* The telephone cable plant at Eniwetok shall be tape armored or lead covered subterranean cable and will be obtained by rehabilitation and readjustment of the presently installed subterranean cable plant in accordance with cable plant maps (Chart 5, Appendix VI) which show details of rehabilitated cable plant. Such new cable as is required to insure suitable operating facilities may be installed. This cable will be obtained from the civilian contractor or, if available, from Signal Corps stocks.

i. *Radio Nets.* (See Chart 6, Appendix VI.)

17. TASK GROUP 3.2 COMMUNICATIONS PERSONNEL

Communications personnel of the Task Group 3.2 consisting of 9 officers and 146 enlisted men will be assigned to the 7127th AU Communications Detachment. Two officers and 50 enlisted men of this detachment will be quartered on Parry Island for the purpose of operating the JTF–3 Communications Center. The remaining seven officers and 96 enlisted men will be based on Eniwetok Island for the purpose of accomplishing the Task Group 3.2 communications mission. Whenever JTF–3 is exercising operational control of Headquarters JTF–3 communications facilities, operating personnel of the 7127th AU concerned in these facilities will be considered as on special duty with JTF–3. (See Appendix VIII.)

18. TASK GROUP 3.2 COMMUNICATIONS FOR EMERGENCY EVACUATION

a. Task Group 3.2 will provide communications by means of existing fixed mobile and tactical facilities for emergency evacuation of JTF–3.

b. Should an emergency evacuation become necessary as a result of enemy action and it appears that capture of equipment appears imminent, all classified documents and devices will be destroyed in accordance with applicable regulations. All other communications equipment which cannot be evacuated will be rendered unfit for further use or repair in accordance with applicable technical manuals.

19. TASK GROUP 3.2 COMMUNICATIONS FACILITIES ROLL-UP

a. Upon completion of Operation GREENHOUSE operational control of Hqs, JTF–3 communications facilities will be relinquished. TG 3.2 will continue to operate the communication facilities required to support the roll-up plans.

b. As soon as Hqs, JTF–3, ceases to operate on Parry Island, all classified cryptographic equipment and documents in use in the Parry Communications Center will be returned to the issuing office by the Cryptographic Security Officer, TG 3.2.

c. Assuming that the Atomic Energy Commission decides to acquire communications equipment used by it during Operation GREENHOUSE for permanent retention and use at the Eniwetok Atoll Proving Grounds, a property transfer will be effected between the Property Officer, TG 3.2, and the AEC Property Officer for Eniwetok Atoll.

d. AN/TRC–1 and CF–1 and associated equipment installed in the Parry Communications Center and all fixed plant communications equipment on Eniwetok which is not required during the period between operations will be tropical packed in place. The Communications Center rooms not used will be locked and sealed.

[redacted]

e. Portable stand-by communications power units on Parry Island and those on Eniwetok Island not required by the Atoll Command will be removed to the Signal Warehouse on Eniwetok Island where they will be tropical packed and stored until required for subsequent operations.

f. Roll-up disposition of the telephone system equipment on Parry and shot islands will be in accordance with the communications roll-up plans of TG 3.1 as approved by JTF–3.

g. On Eniwetok Island the telephone plant, signal equipment and certain portions of the fixed plant radio transmitting and receiving equipment and communications center equipment will be required for retention and use during the period between operations. These items will be transferred from the Property Officer, TG 3.2, to the Property Officer of the Garrison Force.

h. Cryptographic equipment and documents on hand at the TG 3.2 Communications Center and not required by the Atoll Commander will be turned in to the issuing agency by the Cryptographic Security Officer.

i. The K–53 van, with back-up equipment mounted will be sealed with equipment in place after the van has been packed with dessicant and provided with a window-mounted humidity meter. This van, together with trailer K–52, will be stored in the signal warehouse where it will be checked periodically by caretaker personnel to replace dessicant when required.

j. Excess perishable signal supply items, tactical communications equipment on memorandum receipt to TG 3.1 and TG 3.2, items of fixed communications equipment and other equipment not required for retention by AEC or required by the Atoll Commander will be tropical packed and returned to Signal Corps Depot Stock or as otherwise directed by the Chief Signal Officer.

k. The above roll-up operations will be performed by personnel of TG 3.2 with materials to be provided by Hqs, JTF–3.

20. TASK GROUP 3.3 COMMUNICATION MISSION

a. Provide all internal TG 3.3 communication, including the provision of a communications center aboard the USS CURTISS (AV–4) to be established as a tributary of the Hqs, JTF–3 Communications Center on Parry Island for the purpose of providing telephone and teletype communications for the Commander, TG 3.3, and for weapons assembly personnel of TG 3.1 within the Task Force.

b. Provide communications between Commander, TG 3.3, and the Navy Department, Naval Operating Forces not directly concerned with GREENHOUSE and Naval Shore establishments.

c. Install, operate and maintain sonobuoy equipment in the channels leading into the Eniwetok Atoll together with associated monitor receivers.

d. Provide communications to be employed in the event emergency evacuation of the area becomes necessary.

e. Establish guard mail and Officer Messenger Mail Service between units afloat and the Flagship, and between Hqs, JTF–3, on Parry Island and the Flagship.

f. Provide Class "E" message service. This service is to be strictly limited to messages of an emergency nature from military personnel.

g. Supply communications of any nature, upon request, necessary to fulfill the mission assigned Commander, Joint Task Force THREE.

h. Communicate as necessary to enable CTG 3.3 to perform the duties of SOPA (Senior Officer Present Afloat), Eniwetok.

i. Procure and maintain necessary electronic equipment and supplies to meet the communications requirements of Navy Task Group 3.3.

j. Guard the International distress frequency (500Kc), relieving TG 3.2 of this responsibility while in the forward area.

21. TASK GROUP 3.3 COMMUNICATION SERVICES

a. *Communication Center.* The communication center of the Task Group Flagship shall be employed as the Task Group Commander's Communication Center. All communications sent or received by rapid means shall clear through this Communications Center, except that traffic in the SIGTOT Tape System shall originate and terminate in the Teletype Room. When the Flagship is moored to the buoy, com-

munications to the Communications Center on Parry Island shall be over a 6-pair submarine cable. AN/TRC-1 and CF-1 equipment shall be employed for back-up to this cable and for communications at such times as the Flagship is away from the buoy.

b. The Code Room of the Task Group Flagship shall serve as the Task Group Commander's Code Room. Encrypted traffic in SIGTOT Tape Systems, shall be handled in the Teletype Room. When the Flagship is moored to the buoy, traffic bearing a classification up to *SECRET,* addressed to local commands may be transmitted unencrypted. Whenever the Flagship is away from the buoy or whenever the AN/TRC-1 and CF-1 equipment is being employed, all classified traffic addressed to local commands shall be encrypted. SIGTOT Tape Systems shall be employed for the encryption of all traffic addressed to commands served by the JTF-3 Communications Center.

c. *Ship-to-shore communications.* Normal Naval ship-to-shore channels shall be employed as necessary by CTG 3.3. In addition, a CW circuit (P33, JANAP 195 (A)) shall be employed for communication with Navy Radio Kwajalein. This circuit will be shared with P33 operated by TG 3.2. A duplex RATT circuit (P14, JANAP 195 (A)) for communication with Navy Radio Guam shall be established.

d. *Administrative Radio.* Communication services as outlined in subparagraph *c* shall be employed for administrative radio traffic. Administrative traffic addressed to commands served by the JTF-3 Communications Center shall be delivered through that center.

e. *Navigational Aids.* Established navigational aids and equipment shall be employed by vessels and aircraft of TG 3.3. TG 3.3 shall ensure that all notices concerning the establishment, dis-establishment and changes in operation of navigational aids are promulgated to the Task Force.

f. *Tactical Control.* Tactical control of vessels and aircraft of TG 3.3 shall be exercised by TG 3.3, utilizing communications circuits and channels as provided for in the Communication Annex to the TG 3.3 Operation Plan.

g. Radar and IFF shall be employed by vessels and aircraft of TG 3.3 as directed by TG 3.3 and/or JTF-3.

22. TASK GROUP 3.3 COMMUNICATION FACILITIES

(See Appendix IX for JTF-3 Communications aboard the USS CURTISS.)

Task Group 3.3 communication facilities include those facilities for rapid communication aboard the Flagship of TG 3.3 plus the facilities of the Naval Communication System. These facilities are designed for and provide for communication between TG 3.3 and other task group commanders and between TG 3.3 and JTF-3, and, in addition, enable TG 3.3 to exercise operational control over vessels and aircraft assigned to his task group.

23. TASK GROUP 3.3 COMMUNICATIONS PERSONNEL

The Staff Communications Officer is responsible to TG 3.3 for the proper administration of all external communications of both the Flag and the Flagship. Personnel requirements are determined and established by the Chief of Naval Operations. Communications personnel of both the staff and Flagship are employed as a unit in carrying out the communications mission of TG 3.3.

24. TASK GROUP 3.3 COMMUNICATIONS FOR EMERGENCY EVACUATION

Communications for emergency evacuation shall be as indicated in the Communication Annex to the JTF-3 Evacuation Plan. This annex is so designed that a minimum of change is required to shift from an operational status.

25. TASK GROUP 3.3 COMMUNICATIONS ROLL-UP

a. Where vessels and aircraft are released from operational control by TG 3.3 they shall immediately shift communications to those prescribed in applicable orders and/or in USF 70 (B).

b. When directed, the sonobuoys and associated equipment shall be disposed of as directed by Naval Shipyard, Pearl Harbor.

[redacted]

c. Special communication equipment aboard the Flagship shall be disposed of in accordance with the decision of the agency concerned.

d. Communications equipment on loan from other activities shall be disposed of as directed by those activities.

26. TASK GROUP 3.4 COMMUNICATIONS MISSION

The communications mission of Task Group 3.4 includes:

a. Provision of internal air task group communications, including the establishment of a teletype communication Center (Less Code Room) at Hqs, TG 3.4 on Eniwetok Island as a tributary of the Hqs, JTF-3 Communications Center for the purpose of providing teletype communications for the Commander, TG 3.4.

b. Provision of communication between CTG 3.4 and external Air Force installations pertaining to administration and logistics in support of Operation GREENHOUSE.

c. Provision of administrative, weather, aircraft movement and ground to air communications and radio aids to air navigation necessary for Task Group 3.4 participation in Operation GREENHOUSE.

d. Provision of communications to effect control against possible undesirable air activity within the area, including an accurate communications system for proper liaison between Joint Task Force Auxiliary Headquarters and other concerned GCI afloat.

e. Procurement of necessary electronic equipment and maintenance supplies to meet communications requirements of TG 3.4.

f. Maintenance and calibration of all electronic equipment utilized by Task Group 3.4.

g. Preparation of the communications and electronic plan for TG 3.4.

27. TASK GROUP 3.4 COMMUNICATIONS SERVICE

a. Communications Center

Communications Centers will be established on Eniwetok and Kwajalein. On Eniwetok cryptographic work for TG 3.4 will be by TG 3.2 and on Kwajalein by the AACS facilities there.

b. Telephone Service

Administrative telephone service is provided by TG 3.2.

c. Teletype conference service is provided by TG 3.2.

d. Communications Security

(1) All wire lines within the Atoll are approved for traffic classified up to and including SECRET. Traffic of higher classification will be transmitted by courier or encipherment.

(2) Security monitoring is provided by JTF-3.

(3) Radio back-up systems are not approved for handling or discussing classified matter in the clear.

e. Radio Service

Normal operations and administrative radio and radio-teletype circuits will be established, except that wherever possible the long haul JTF-3 circuits will not be duplicated.

f. An Air Operations Center for monitoring air traffic pertaining to Operation GREENHOUSE will be established in Eniwetok.

g. Such tactical communications as are required to support and control the tactical air mission of TG 3.4 will be provided.

28. TASK GROUP 3.4 COMMUNICATIONS FOR EMERGENCY EVACUATION

a. Normal communications facilities will be continued in operation until otherwise directed or relieved.

b. Special communications required for emergency evacuation are contingent on the emergency and will be as prescribed in applicable emergency plans.

29. TASK GROUP 3.4 COMMUNICATIONS FACILITIES

a. Hqs, TG 3.4 aircraft communications will be such as to provide for all essential airways control and operations. (See Annex "D" to Op-Plan 1-50, TG 3.4.)

b. An electronics shop equipped with field maintenance facilities will be established on Eniwetok. Provision for first and second electronics maintenance will be made at Kwajalein.

[redacted]

c. Warehousing, storage, and supply of electronics equipment will be accomplished on Eniwetok.

d. Such inter-communications systems as are required will be the responsibility of TG 3.4, but will not use pairs in telephone cables.

30. TASK GROUP 3.4 COMMUNICATIONS PERSONNEL

All personnel to operate TG 3.4 communications on Eniwetok and Kwajalein will be requisitioned and procured from Air Force sources.

31. TASK GROUP 3.4 COMMUNICATIONS FACILITIES ROLL-UP

a. On completion of Operation GREENHOUSE such communications equipment as is no longer required will be returned to agencies concerned.

b. Essential airways control communications required for Atoll operation will remain in place.

E. R. QUESADA
Lieutenant General,
United States Air Force
Commander

AUTHENTICATION:
EARLE F. COOK
Colonel, United States Army
Acting Assistant Chief of Staff, J–5

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ACofS, G–3, USA	3 – 22
Dir P&O, USAF	23 – 32
CNO (Op–36)	33 – 42
SJS, JTF–3	43 – 44
ACofS, J–1, JTF–3	45 – 49
ACofS, J–2, JTF–3	50 – 54
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Appendices to Annex "F" Field Order #2, Hqs, JTF–3, are referenced to the following material appearing in this report.

Appendices of Annex "F"

Appendix	I.	See Figure 3 of this report.
Appendix	II.	See Figure 22 of this report.
Appendix	III.	See Figure 100 of this report.
Appendix	IV.	See Appendix 6 of this report.
Appendix	V.	See Appendix 12 of this report.
Appendix	VI.	Chart 1—Figure 31 Chart 2—Figure 32 Chart 3—Figure 41 Chart 4—Figure 35 Chart 5—Figure 30 Chart 6—Figure 20
Appendix	VII.	See Appendix 13 of this report.
Appendix	VIII.	See Figure 6 of this report.
Appendix	IX.	See Figure 64 of this report.
Appendix	X.	See Appendix 5 of this report.

[redacted]

Appendix II

HEADQUARTERS

JOINT TASK FORCE THREE

Eniwetok Atoll, M. I.

31 March 51

COMMUNICATIONS ORDER NUMBER 1

1. GENERAL INFORMATION

a. This operations order sets forth the procedure to be followed during the test of all electronic and communications equipment in operation.

b. This test will commence at 0700 hours Sunday 1 April 1951 and continue until all communications and electronic equipment has been operated and monitored in accordance with the schedule indicated herein. This is an operational test and will similate the operations as they will be on Dog and Dog X-Ray days. Standard operating procedures will be followed on all circuits. If any deviations from the following schedule or any additional circuits not listed are added, the J–5 Division, Headquarters, JTF–3, will be notified immediately through communications channels. Wherever frequencies employed preclude normal traffic handling communications officers will advise circuit terminals by classified service note. (Consider this time part of maintenance schedule during which traffic will not be passed.)

c. Interferences will be reported immediately to the J–5 Division, Hq, JTF–3, through communications channels, stating time and type of interference, frequency and circuit interfered with. Assistant Chief of Staff, J–5, Hq, JTF–3, and each task group communications officer will monitor this program from their respective operations centers.

2. MISSION

a. To determine and eliminate interferences and other defects in communications which might occur on Dog Shot.

b. To insure satisfactory communications for Operation GREENHOUSE.

3. TASKS FOR SUBORDINATE UNITS

a. Task Group 3.1

(1) Monitor all frequencies of equipment utilized in projects of TG 3.1 for interferences.

(2) Operate communications and electronics equipment on the following circuits:

J–1, J–2, J–3, J–5, J–6, J–7, J–8, J–9, J–10, J–11, J–12, J–13, and J–15 during the period 0750 to 0800 for flight one (1).

(3) Commence time broadcast for flight number one (1) (see para 3d below) at 0659, assuming H hour at 0800 on circuit J–4.

(4) Commence time signal broadcast for flight number two (2) at 0929, assuming H hour at 1030 on circuit J–4.

(5) Commence time signal broadcast for flight number three (3) at 1259, assuming H hour at 1400 on circuit J–4.

(6)

Flight	From	To
1 (One)	0750	0800
2 (Two)	1020	1030
3 (Three)	1350	1400

b. Task Group 3.2

(1) Monitor all frequencies of equipment utilized in projects of TG 3.2 for interferences.

(2) Operate communications and electronics equipment on the following circuits:

J–31, J–32, J–33, J–34, J–35, J–36, J–40, J–41, J–42, and J–49 during the periods listed below.

[redacted]

(3)

Flight	From	To
1 (One)	0710	0930
2 (Two)	0940	1100
3 (Three)	1310	1500

(4) Monitor time broadcast (see paragraph 3a (3), 3a (4) and 3a (5) above).

(5) Radio back-up AN/TRC circuits will be turned on as follows:

Time	Frequency	Transmitting Station	Receiving Station
0950–0955	72.2	Parry	Eniwetok
0955–1000	78.0	Eniwetok	Parry
1000–1005	80.0	Curtiss	Parry
1005–1010	83.0	Parry	Curtiss
1010–1015	95.4	Van	Eniwetok
1015–1020	98.8	Eniwetok	Van

This is a one-time transmission only.

(6) AN/TRC receivers will continue to monitor their frequencies during tests.

c. Task Group 3.3

(1) Monitor all frequencies of equipment utilized in projects of Task Group 3.3 for interferences.

(2) Operate communications and electronics equipment on the following circuits at times given below:

Flight	From	To
1 (One)	0730	0930
2 (Two)	1000	1100
3 (Three)	1330	1500

J–50, J–51, J–52, J–53, J–54, J–56, J–57, and J–58 during the period 0730 to 0740.

(3) Rebroadcast simultaneously voice time signals on circuit J–60 (see paragraphs 3a (3), 3a (4), 3a (5) above).

d. Task Group 3.4

(1) The following flights of aircraft have been arranged by communications officer TG 3.4:

Flight	Take Off	H (Hour)
1 (One)	0700	0800
2 (Two)	0930	1030
3 (Three)	1300	1400

(2) Monitor all frequencies of equipment utilized in projects of TG 3.4 for interferences.

(3) Operate communications and electronics equipment on the following circuits:

J–97, J–85, J–86, J–87, J–88, J–89, J–90, J–83, and the AOC radio and radar circuits turned on at 20 second intervals in the above sequence during the period 0700 to 0705. The following circuits will be added during the period 0705 to 0710 for flight #1 and on a similar schedule for flights #2 and #3 as listed below:

J–73A, J–84, J–89B, J–92, J–93, J–94, J–95, J–96, J–98, and J–99.

Flight	From	To
1 (One)	0700	0930
2 (Two)	0930	1100
3 (Three)	1300	1500

(4) Voice timing signals will be simultaneously rebroadcast on the following VHF Frequencies: (see paragraphs 3a (3), 3a (4), 3a (5) above for primary broadcast.)

135.72 Mcs	132.12 Mcs
131.50 Mcs	141.66 Mcs
143.10 Mcs	

4. Radio pulse equipment operated on the 8.3B project will be turned on at 0930 and unless otherwise directed cease operation at 1030 hours.

LELAND H. STANFORD
Colonel, Sig C
Asst. C/S J–5 Div

[redacted]

Appendix III

HEADQUARTERS

JOINT TASK FORCE THREE

APO 187 (HOW) c/o Postmaster

San Francisco, Calif

AG 400 22 May 1951

SUBJECT: Table of Allowances for Signal Equipment, AEC Proving Grounds, Eniwetok Atoll, M. I.

TO: Department of the Army
Washington 25, D. C.

1. It is requested that the attached list of equipment be approved and published as a special table of allowances of non-expendable signal equipment authorized for retention and use at the Atomic Energy Commission Proving Grounds, Eniwetok Atoll, M. I.

2. Inclosure 1 represents those items used by service and scientific task groups of Joint Task Force THREE in support of Operation GREENHOUSE. Inclosure 2 is a list of equipment turned in to the Property Officer, Task Group 3.2 by the 511th Transportation Port Company and the 516th Military Police Service Company.

3. A progressive roll-up of these facilities is currently in progress and all equipment not required for garrison use is either being tropically packed in place or in warehouse storage for use in support of subsequent joint task force operations at Eniwetok.

FOR THE COMMANDER:

EMORY W. COFIELD
Colonel USAF
Adjutant General

2 Incls:
1 TO&E AECPG, Eniwetok Atoll
2 SigC Equip. used by 511 Trans. Port. Co. & 516 MP Svc Co.

Copy furnished:
Comander, Task Group 3.2

[redacted]

TABLE OF ALLOWANCES FOR SIGNAL EQUIPMENT, AEC PROVING GROUNDS, ENIWETOK ATOLL, M. I.

ITEM	STOCK NUMBER	NOMENCLATURE	1 UNIT	2 COMM CENTER ENIWETOK	3 COMM CENTER PARRY	4 RADIO BRANCH MONITOR	5 RADIO BRANCH RECEIVER	6 RADIO BRANCH TRANSMITTER	7 WIRE BRANCH	8 INSTALL AND MAINT	9 HOLMES AND NARVER	10 JTF-3	11 TG 3.1	12 TG 3.2	13 TG 3.3	14 TG 3.4	15 WAREHOUSE	16 TOTAL	17 EXCESS	18 DEAD STOCK	19 GARRISON USE	20 SHORTAGES
1	1B110B.1	Wire	ea		1				5	3						2		11			11	
2	1B110B.2	Wire	ea										2				13	15			15	
3	1B143	Cable, Telephone	ea						6								10	16			16	
4	1B190-1.2	Wire, Electrical	ea									2	1			2	19	24		19	5	
5	1B1534-1000	Cable, Telephone	ea							1								1		1		
6	2A262	Antenna	ea							1								1			1	
7	2A275-28	Antenna	ea														3	3	3			
8	2A275-131	Antenna	ea														19	19		19		
9	2A1617-1	Antenna Kit	ea					1									1	2		1	1	
10	2A1622-1	Transmission Line Kit	ea				2										3	5		3	2	
11	2A2081-15	Mast Base	ea					2										2			2	
12	2A2088-48	Mast Base	ea														4	4			4	
13	2A2090-50	Bracket, Mast Base	ea					2				2	35		2		13	54		41	13	
14	2A2349	Mast Section	ea														6	6		6		
15	2A2350	Mast Section	ea														6	6		6		
16	2A2351	Mast Section	ea														6	6		6		
17	2A2352	Mast Section	ea														6	6		6		
18	2A2353	Mast Section	ea														6	6		6		
19	2A2416	Mast Section	ea					2			6	1						9		6	3	
20	2A2417	Mast Section	ea					2				2						4		1	3	
21	2A2418	Mast Section	ea					2				2					5	9		6	3	
22	2A2698	Coupling Unit	ea					2										2		2		
23	2B823	Headset	ea	1			3							5		2		11		8	3	
24	2B830	Headset	ea								6				1	2	1	10		10		
25	2B833	Headset	ea														1	1			1	
26	2B918	Headset	ea					1										1			1	
27	2B1617	Microphone	ea							4	28		35	1	10	3	68	149		149		
28	2B1645	Microphone	ea								6				3		3	12		12		
29	2C214	Amplifier, Speech	ea					3		2							1	6		4	2	
30	2C466	Amplifier Equipment	ea					1										1		1		
31	2C720-31	Receiving Equipment	ea				2											2		2		
32	2C720-31B	Dual Diversity Converter	ea				1											1			1	
33	2C1411.5	Frequency Meter	ea			2	1	1		2	1						1	8		7	1	
34	2C1501	Calibrator, Frequency	ea														2	2		2		
35	2C2710-86	Exciter Unit	ea					1									1	2		2		
36	2C4180-80	Radio Receiver	ea														1	1		1		
37	2C4342	Radio Receiver	ea			2								1		3	4	10		10		

38	2C4460–683	Radio Receiver	ea							1								1		1		
39	2C4529–1	Radio Receiver	ea			1		1		1							2	5		5		
40	2C4535.1	Radio Receiver	ea		1	6				1		2	1	4			1	16		16		4
41	2C4535.6	Radio Receiver	ea									2						2		2		
42	2C4537–36	Radio Receiver	ea			10						2						12		12		
43	2C4779	Radio Receiver	ea			2	3										3	8		6	2	
44	2C4779.1	Radio Receiver	ea				4	1			2						1	8		7	1	
45	2C4794.1	Radio Receiver	ea				1											1		1		
46	2C6339N	Radio Transmitter	ea				2											2		1	1	
47	2C6500	Radio Transmitter	ea				2		1								1	4		1	3	
48	2C6500E	Radio Transmitter	ea				4											4		4		
49	2C6530–684	Radio Transmitter	ea						1									1			1	
50	2C6530–684BM	Radio Transmitter	ea														1	1			1	
51	2C7600–261	Control Unit	ea														6	6			6	
52	2S300	Radio Set	ea			2							56	2		2	3	65		60	5	
53	2S508/12	Basic Unit	ea								15		17				18	50		30	20	
54	2S508–NA/24	Radio Set	ea														20	20			20	
55	2S508–NA/50	Installation Unit	ea														5	5			5	
56	2S508–V26/50	Installation Unit	ea												6		1	7			7	
57	2S508–V36/50	Installation Unit	ea														7	7			7	
58	2S509	Radio Set	ea											6				6		6		
59	2S510/12	Radio Set	ea										31		3			34		24	10	
60	2S510–NA/50	Installation Unit	ea										21					21		15	6	
61	2S510–V26/50	Installation Unit	ea										5					5			5	
62	2S510–V36/12	Radio Set	ea														31	31		23	8	
63	2S510–V36/12/50	Installation Unit	ea														3	3			3	
64	2S543	Radio Set	ea										2					2		2		
65	2S608B/12	Basic Unit	ea								5			5				10		5	5	
66	2S619/6–12–24	Radio Set	ea								12						1	13		13		
67	2S628/12	Basic Unit	ea											3			12	15	8	3	4	
68	2S694/6–12–24	Radio Set	ea												2		1	3		2	1	
69	2S2001–12	Radio Receiving Set	ea				3										1	4		3	1	
70	2S2002–6A	Radio Set	ea											1			1	1				1
71	2S5002–1.1	Radio Set	ea							2								2				2
72	2S5002–3	Radio Set	ea														2	2				2
73	2S5002–3.1	Radio Set	ea	1	1					1							1	4			1	3
74	2S5002–3.1–1	Accessory Group	ea														1	1				1
75	2S5006.1	Amplifier	ea	1	1													2		2		
76	2X12–2716	Xtal Unit	ea					2										2			2	
77	2X12–2844	Xtal Unit	ea					2										2			2	
78	2X12–4367.5	Xtal Unit	ea					6										6			6	
79	2X12–4610	Xtal Unit	ea				2											2			2	
80	2X12–5102.500	Xtal Unit	ea					1										1			1	
81	2X13.1–12	Xtal Unit	ea							1		1						2			2	
82	2X14–2382.5	Xtal Unit	ea												2			2			2	
83	2X28–953.1	Xtal Unit	ea											1				1			1	
84	2X28–6550	Xtal Unit	ea											1				1			1	

TABLE OF ALLOWANCES FOR SIGNAL EQUIPMENT, AEC PROVING GROUNDS, ENIWETOK ATOLL, M. I. (*Continued*)

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ITEM	STOCK NUMBER	NOMENCLATURE	UNIT	COMM CENTER ENIWETOK	COMM CENTER PARRY	RADIO BRANCH MONITOR	RADIO BRANCH RECEIVER	RADIO BRANCH TRANSMITTER	WIRE BRANCH	INSTALL AND MAINT	HOLMES AND NARVER	JTF-3	TG 3.1	TG 3.2	TG 3.3	TG 3.4	WAREHOUSE	TOTAL	EXCESS	DEAD STOCK	GARRISON USE	SHORTAGES
85	2X75-2033.803	Xtal Unit	ea			2												2			2	
86	2X75-2261.928	Xtal Unit	ea			1												1			1	
87	2X75-2280.160	Xtal Unit	ea			2												2			2	
88	2X75-2618.856	Xtal Unit	ea			2												2			2	
89	2XA1.1-1	Xtal Blank	ea				5											5			5	
90	2XA1.1-2	Xtal Blank	ea				5											5			5	
91	2XA1.1-2.5	Xtal Blank	ea				5											5			5	
92	2XA1.1-3	Xtal Blank	ea				5											5			5	
93	2XA1.1-3.5	Xtal Blank	ea				5											5			5	
94	2XA1.2-0.9	Xtal Blank	ea														5	5			5	
95	2XA1.2-1	Xtal Blank	ea				5											5			5	
96	2XA1.2-2	Xtal Blank	ea				5											5			5	
97	2XA1.2-3	Xtal Blank	ea				5											5			5	
98	2XA1.2-3.5	Xtal Blank	ea				5											5			5	
99	2XA1.3-0.225	Xtal Blank	ea				2											2			2	
100	2XA1.3-0.275	Xtal Blank	ea				2											2			2	
101	2XA1.3-2.5	Xtal Blank	ea				2											2			2	
102	2XA1.3-3	Xtal Blank	ea				2											2			2	
103	2XA1.3-3.5	Xtal Blank	ea				2											2			2	
104	2Z1574	Chest	ea								16			2	5		4	27		23	4	
105	2Z1576	Cabinet	ea			5	4	2									2	13		13		
106	2Z1578.10	Cabinet	ea			1						1						2		2		
107	2Z2576	Chest	ea	4	2						1							7		5		
108	2Z5731-129	Adapter Set	ea			1												1			1	
109	2Z5731-949	Adapter Kit	ea			1												1			1	
110	2Z6303.1	Loudspeaker	ea				8	1		6		6	3	5	1	2	7	39		32	7	
111	2Z6413	Maintenance Equipment	ea												1			1		1		
112	2Z6434	Maintenance Equipment	ea														1	1		1		
113	2Z6440	Maintenance Equipment	ea														2	2		2		
114	2Z7512	Rectifier	ea														3	3		3		
115	3B54	Battery	ea								1							1			1	
116	3B55	Battery	ea				4				4		8	11	2	7	17	53			53	
117	3B275-221	Battery	ea										28				2	30			30	
118	3B2202	Hydrometer	ea				1											1			1	
119	3B2220	Hydrometer	ea							1				1				2			2	
120	3F1-384	Adapter	ea							2	1							3		2	1	
121	3F910-9	Meter	ea														2	2		1	1	

122	3F1780–150	Test Block	ea														1	1			1	
123	3F3309.2	Meter	ea														2	2		2		
124	3F3582–14	Test Set	ea				1											1			1	
125	3F3630–1060	Oscilloscope	ea				1											1			1	
126	3F3640–134	Oscilloscope	ea			8				1	1						2	12		12		
127	3F3802–150	Shunt, Meter	ea														1	1			1	
128	3F3802–300	Shunt, Meter	ea														1	1			1	
129	3F3852	Generator	ea				1	1		1								3		3		
130	3F3868–2	Generator	ea			2												2		2		
131	3F3900–208	Generator	ea				1			1	1							3		3		
132	3F3933–29	Test Equipment	ea														1	1			1	
133	3F4040–1	Test Set	ea				1											1		1		
134	3F4048B	Test Set	ea				1										1	2		1	1	
135	3F4049	Bridge, Resistance	ea						1									1			1	
136	3F4056K	Test Equipment	ea				1	1		3					1	4	2	12		12		
137	3F4065	Test Set	ea						1									1			1	
138	3F4072–14	Meter	ea							1								1		1		
139	3F4193A	Test Set	ea	1	1												1	3		2	1	
140	3F4325–152	Oscilloscope	ea				1										1	2		2		
141	3F4325–200	Test Set	ea				1											1		1		
142	3F4325–297	Multimeter	ea	2	2				2		2			1			2	11		11		
143	3F4325–308	Oscillator	ea			1												1		1		
144	3F4325–312	Oscillator	ea				2	1										3		3		
145	3F4470–176	Meter	ea												1		1	2		2		
146	3F5700–177	Tube Tester	ea													1		1		1		
147	3F6318	Meter	ea														1	1		1		
148	3F8300–14	Meter	ea				1											1		1		
149	3F8300–33	Meter	ea												1			1		1		
150	3H1621CX	Dynamotor	ea														3	3		3		
151	3H1634	Dynamotor	ea							5							8	13		13		
152	3H1635	Dynamotor	ea							5	3						7	15		15		
153	3H1636	Dynamotor	ea														3	3		3		
154	3H1637	Dynamotor	ea														2	2		2		
155	3H4496–74	Power Supply	ea				2											2		2		
156	3H4496–74C	Power Supply	ea				1											1			1	
157	3H4496–84	Power Supply	ea				1											1			1	
158	3H4496–94	Power Supply	ea				3											3			3	
159	3H4497–13	Power Supply	ea														1	1		1		
160	3H4575	Power Supply	ea							1	2			2			1	6		5	1	
161	3H4595G	Power Supply	ea	2	2		2											6		4	2	
162	3H4600–215	Power Supply	ea					2										2		1	1	
163	3H4676	Rectifier	ea											2				2		2		
164	3H4691–133	Power Supply	ea				2										1	3		1	2	
165	3H4699–83	Charger	ea				2				2		4	2			2	12		10	2	
166	3H4699–87	Rectifier	ea														1	1			1	
167	3H4956–24	Power Supply	ea				2											2			2	
168	3H6694–11	Vibrator	ea	1													1	2		2		

TABLE OF ALLOWANCES FOR SIGNAL EQUIPMENT, AEC PROVING GROUNDS, ENIWETOK ATOLL, M. I. (*Continued*)

ITEM	STOCK NUMBER	NOMENCLATURE	1 UNIT	2 COMM CENTER ENIWETOK	3 COMM CENTER PARRY	4 RADIO BRANCH MONITOR	5 RADIO BRANCH RECEIVER	6 RADIO BRANCH TRANSMITTER	7 WIRE BRANCH	8 INSTALL AND MAINT	9 HOLMES AND NARVER	10 JTF–3	11 TG 3.1	12 TG 3.2	13 TG 3.3	14 TG 3.4	15 WAREHOUSE	16 TOTAL	17 EXCESS	18 DEAD STOCK	19 GARRISON USE	20 SHORTAGES
169	3H6711	Vibrator	ea														4	4			4	
170	3H6712	Vibrator	ea										10				1	11		11		
171	3Z3433	Key	ea				1											1			1	
172	3Z3436	Key	ea							2							2	4		2	2	
173	4A985	Adapter	ea													2		2	2			
174	4A2132–30	Repeater	ea				1										1	2			2	
175	4A2593–6	Switchboard	ea	2	1		4	2										9		9		
176	4A2822	Telegraph Terminal Set	ea	2	2													4		4		
177	4B417	Chest Set	ea														12	12	12			
178	4B1158	Handset	ea											1				1		1		
179	4B1485	Intercommunication Set	ea									12						12		12		
180	4B4254A	Switchbox	ea						10			32	2				18	62		46	16	
181	4B5008	Telephone	ea						10	1	40	15	11			21	28	126		126		
182	4B4540	Telephone	ea						175		50						20	245		200	45	
183	4B5452	Telephone	ea						35		20				6		34	95		61	34	
184	4B5500–9	Telephone	ea									10					1	11		1	10	
185	4B5669.1A	Telephone	ea						18								6	24		24		
186	4B8360–21	Telephone Terminal Set	ea	3	2												1	6		6		
187	4B8361A	Terminal	ea							1							1	2		1	1	
188	4C2902	Chair	ea						3									3		3		
189	4C4911	Switch	ea									10						10		10		
190	4C9905–66	Switchboard	ea														1	1			1	
191	4C9972	Switchboard	ea									1				2	1	4		4		
192	4C9974	Switchboard	ea	1	1													2		2		
193	4C10110	Switchboard	ea														6	6		6		
194	4C19325	Switchboard	ea														2	2		2		
195	4C27012	Telephone Set	ea													1	1	2		2		
196	4F2101	Ringing Equipment	ea	4	2					2								8		4	4	
197	4F2124	Converter	ea	3	3												1	7		6	1	
198	4F2316	Ringing Set	ea														1	1		1		
199	4T2.18A–1	Teletypewriter	ea	1	1	3	1											6		6		
200	4T2.28	Teletypewriter	ea					1										1			1	
201	4T4.6A–1	Teletypewriter	ea	2	3													5		2	3	
202	4T4.15A–1	Teletypewriter	ea		3	2											1	6			6	
203	4T12.1A–1	Reperforator	ea														3	3	2		1	
204	4T1000–1A	Teletype set	ea		2													2		2		
205	4T89500	Punch	ea														2	2		1	1	

206	4T105738	Motor	ea														2	2		1	1	
207	4TBB49	Base Assembly	ea	1														1		1		
208	4TBP114/210	Typing Unit	ea		1												1	2		1	1	
209	4TED57GG	Distortion Set	ea	1													1	2		1	1	
210	4TEE97A	Teletypewriter	ea	1	1													2			2	
211	4TEE98A	Teletypewriter	ea	7	7													14		14		
212	4T4TFB43	Base Assembly	ea														1	1			1	
213	4TFPR21GB226	Reperforator	ea	2													1	3		3		
214	4TMU27	Motor Assembly	ea														2	2			2	
215	4TTC16	Teletypewriter Set	ea	7	6		1										1	15		15		
216	4TW131–B2	Terminal Equipment	ea	4	3												2	9		7	2	
217	4TW133–A2	Typewriter Set	ea	2														2		2		
218	4TXD79EY	Transmitter Distributor	ea		3													3		3		
219	4TXD86FR	Transmitter Distributor	ea	2														2		2		
220	4TXD95GW	Transmitter Distributor	ea	1	2													3		1	2	
221	4TXD100GW	Transmitter Distributor	ea	3														3		1	2	
222	4Z363C	Bell	ea														30	30		30		
223	5C526G	Cable Terminal	ea						4								2	6		2	4	
224	5C551E	Terminal	ea						7								6	13		6	7	
225	5C551G	Terminal	ea						3									3			3	
226	5C560–51H	Terminal	ea						1									1			1	
228	5C560–101H	Terminal	ea						3								4	7		4	3	
229	5C2710	Terminal	ea														2	2		2		
230	5C2711	Terminal	ea						7								5	12		5	7	
231	5C2713	Terminal	ea						3		1							4		2	2	
232	6C35–8	Speaker	ea														2	2		2		
233	6C35–12.1	Speaker	ea			1		1		1							2	5		3	2	
234	6C42–103	Loudspeaker	ea											5			1	6		6		
235	6C200–2	PA Equipment	ea											2				2			2	
236	6C205	PA Set	ea							1				1				2			2	
237	6F705	Case	ea						1									1			1	
238	6H2061	Plow	ea						1									1			1	
239	6H6231	Reel	ea						1	1	1							3			3	
240	6J937	Trailer	ea						1									1			1	
241	6J938	Trailer	ea						1									1			1	
242	6J952	Trailer	ea									1					1	2		1	1	
243	6J1043	Truck	ea						1									1			1	
244	6J1044	Truck	ea						1									1			1	
245	6M216–1	Chair	ea	3	2													5			5	
246	6M1211	Stamp, Time	ea	2	1													3		2	1	
247	6M1211A	Stamp, Time	ea		1													1			1	
248	6M1218	Stamp	ea														3	3			3	
249	6M1218–1	Stamp	ea														3	3			3	
250	6M1218–6	Stamp	ea														3	3			3	
251	6M1218–7	Stamp	ea														3	3			3	
252	6M1218–8	Stamp	ea														3	3			3	
253	6M1218–11	Stamp	ea														3	3			3	

TABLE OF ALLOWANCES FOR SIGNAL EQUIPMENT, AEC PROVING GROUNDS, ENIWETOK ATOLL, M. I. (*Continued*)

ITEM	STOCK NUMBER	NOMENCLATURE	1 UNIT	2 COMM CENTER ENIWETOK	3 COMM CENTER PARRY	4 RADIO BRANCH MONITOR	5 RADIO BRANCH RECEIVER	6 RADIO BRANCH TRANSMITTER	7 WIRE BRANCH	8 INSTALL AND MAINT	9 HOLMES AND NARVER	10 JTF-3	11 TG 3.1	12 TG 3.2	13 TG 3.3	14 TG 3.4	15 WAREHOUSE	16 TOTAL	17 EXCESS	18 DEAD STOCK	19 GARRISON USE	20 SHORTAGES
254	6M1218-12	Stamp	ea														3	3			3	
255	6M1218-13	Stamp	ea														3	3			3	
256	6M1218-16	Stamp	ea														3	3			3	
257	6M1218-17	Stamp	ea														3	3			3	
258	6M1218-18	Stamp	ea														3	3			3	
259	6M1688	Typewriter	ea	4	3	2	3	1	1					1		3	5	23		18	5	
260	6Q349	Alignment Tool	ea														2	2		1	1	
261	6Q4523	Belt	ea						1									1			1	
262	6Q4523-36	Belt	ea											3			12	15		12	3	
263	6Q27466	Cleaner	ea	1				1										2		2		
264	6Q27502	Cleaner	ea														3	3			3	
265	6Q28205	Climber	ea						2					3				5			5	
266	6Q38124-8	File	ea						1									1			1	
267	6Q43167	Furnace	ea														2	2		1	1	
268	6Q63521	Linemans Equipment	ea						2									2			2	
269	6R7400	Puller	ea														6	6		4	2	
270	6R27114	Die Set	ea				1											1			1	
271	6R27125	Die Set	ea				1											1			1	
272	6R36936-4	Tong	ea				2											2		1	1	
273	6R38005	Tool Equipment	ea						1								1	2		2		
274	6R38033	Tool Equipment	ea						2									2		2		
275	6R38049	Tool Kit	ea						3									3	2		1	
276	6R38050A	Tool Equipment	ea	3	2												1	6		5	1	
277	6R38056	Cable Splicing Kit	ea						1								1	2	1		1	
278	6R38087A	Tool Equipment	ea						1									1			1	
279	6R38113	Tool Equipment	ea	1		1	1	1		7	1							12		12		
280	6R38114	Tool Equipment	ea							1							1	2		2		
281	6R38152-28	Tool Equipment	ea											1				1		1		
282	6R41065C	Burnisher	ea														1	1			1	
283	6R47020	Vise	ea				1											1			1	
284	6R59344	Wrench	ea														1	1			1	
285	6Z1041	Box	ea														10	10			10	
286	6Z4002	Flashlight	ea								50	30		16		3	19	128		100	28	300
287	6Z6914-290	Lantern	ea				2	1						4			9	16		12	4	
288	8A90	Apron	ea											1				1			1	
289	8A404	Camera Equipment	ea											2				2		1	1	
290	8A424A	Camera	ea											2				2		1	1	

291	8A860	Cup	ea											1				1			1	
292	8A1057C	Exposure Meter	ea											3				3			3	
293	8A1175	Funnel	ea											1				1			1	
294	8A3119-192	Printer	ea											1				1			1	
295	8A3121	Projection Equipment	ea											2			1	3			3	
296	8A3122-222	Projector	ea											1				1			1	
297	8A3144-4	Projector	ea											5				5		2	3	
298	8A3727-185	Tank	ea											1				1			1	
299	8A3829	Timer	ea											1				1			1	
300	8A3911	Tray	ea											3			1	4		1	3	
301	8A4008	Trimmer	ea											1				1			1	
302	NSN	Amplifier, BA2A	ea											2				2		2		
303	NSN	Anvil, Bar Brass	ea				1											1			1	
304	NSN	Anvil, Steel	ea				1											1			1	
305	NSN	Arm, AP-1 w/EQ-1 Phonograph	ea											2				2			2	
306	NSN	Bench, work	ea				1											1			1	
307	NSN	Cabinet Rack 22½" x 17½"	ea		1												1	2		2		
308	NSN	Cabinet Relay	ea				1											1			1	
309	NSN	Can, 5 Gal	ea				1											1			1	
310	NSN	Clamp, Xtal	ea				2											2			2	
311	NSN	Container, Acid	ea				2											2		1	1	
312	NSN	Container, Carbon	ea				2											2		1	1	
313	NSN	Cover, F/FT-171B Holder	ea				5											5	5			
314	NSN	Cover, F/FT-243 Holder	ea				15											15		10	5	
315	NSN	Xtal 4600 kc	ea					2										2			2	
316	NSN	Xtal Unit in FT-171 Freq 4960 9920 kc	ea					2										2			2	
317	NSN	Xtal 5891.666	ea														2	2			2	
318	NSN	Xtal 6693.76	ea					2										2			2	
319	NSN	Xtal Unit in FT-171 Freq 3220 3220 kc	ea					2										2			2	
320	NSN	Xtal Unit in FT-171 Freq 3220 6440 kc	ea					2										2			2	
321	NSN	Xtal Unit in FT-249 Freq 2142.553 18740 kc	ea					2										2			2	
322	NSN	Xtal Unit in FT-249 Freq 2900.106	ea					2										2			2	
323	NSN	Xtal Unit in FT-249 Freq 2923.404	ea					2										2	2			
324	NSN	Xtal Unit in FT-249 Freq 3660.4 7720 kc	ea					2										2			2	
325	NSN	Xtal Unit in FT-171 Freq 3790 15160 kc	ea					2										2			2	
326	NSN	Xtal Unit in FT-171 Freq 4165 8330 kc	ea					2										2			2	

TABLE OF ALLOWANCES FOR SIGNAL EQUIPMENT, AEC PROVING GROUNDS, ENIWETOK ATOLL, M. I. *(Continued)*

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ITEM	STOCK NUMBER	NOMENCLATURE	UNIT	COMM CENTER ENIWETOK	COMM CENTER PARRY	RADIO BRANCH MONITOR	RADIO BRANCH RECEIVER	RADIO BRANCH TRANSMITTER	WIRE BRANCH	INSTALL AND MAINT	HOLMES AND NARVER	JTF-3	TG 3.1	TG 3.2	TG 3.3	TG 3.4	WAREHOUSE	TOTAL	EXCESS	DEAD STOCK	GARRISON USE	SHORTAGES
327	NSN	Xtal Unit in HC-1/U Freq 6237.5 12010 kc	ea					2										2			2	
328	NSN	Xtal Unit in HC-1/U Freq 6321.7 18500 kc	ea					2										2			2	
329	NSN	Xtal Unit in HC-1/U Freq 7775 7310 kc	ea					2										2			2	
330	NSN	Electrodes, F/FT243 Holder	ea				40											40		20	20	
331	NSN	Electrodes, ¾″ F/FT249	ea				20											20		10	10	
332	NSN	Electrodes, 1″ F/FT249	ea				20											20		10	10	
333	NSN	Grinder, Electric	ea				1											1			1	
334	NSN	Hammer, Brass, ½ lb	ea				1											1			1	
335	NSN	Hotplate	ea				1											1			1	
336	NSN	Mandrel	ea														1	1		1		
337	NSN	Multiple Xmtr Keyer	ea	1														1		1		
338	NSN	Oven Temperature Test	ea				1											1			1	
339	NSN	Plate Lapping	ea				3										3	6		6		
340	NSN	Rack Xtal Carrier wd w/10 shelves	ea				1											1			1	
341	NSN	Receiver Radio BC-1004	ea				1											1		1		
342	NSN	Shaker, salt, metal	ea				2											2			2	
343	NSN	Spacer ¾″ F/FT-249	ea														20	20		10	10	
344	NSN	Spacer 1″ F/FT-249	ea				20											20		10	10	
345	NSN	Spring F/FT-243	ea				20											20		10	10	
346	NSN	Spring ¾″ F/FT-249	ea														20	20		10	10	
347	NSN	Spring 1″ F/FT-249	ea				20											20		10	10	
348	NSN	Timer, Automatic 0-15 min.	ea				1											1			1	
349	NSN	Transmitter, Broadcast AN250W	ea											1				1			1	
350	NSN	Transmitter, TCS-12 12V DC	ea										7		1			8		8		
351	NSN	Transmitter, TCS-12 110/220	ea										2					2		2		
352	NSN	Tray, Round Metal	ea				2											2			2	
353	NSN	Tray, Round Metal	ea				2											2			2	
354	NSN	Turntable & Presto 64-A	ea										2					2			2	

355	NSN	Wheel, Grinding F/Duro Grinder	ea	....	....	....	9	....	....	....	....	....	....	....	....	....	....	9	....	6	3	....

REMARKS: 1. Columns 1 thru 15 show utilization of equipment during Operation GREENHOUSE.
2. Columns 18 and 19 show disposition of equipment during roll-up phase.
3. Column 20 represents items of equipment required and not available on site during Operation GREENHOUSE. These items should be requisitioned prior to subsequent operations.
4. Equipment listed in columns 1 thru 8 and 10 represents equipment used by the Army Task Group (TG 3.2). Equipment shown in Column 9 is required by the AEC contractor in the operation of boat pool radio nets and a radio repair shop. Equipment in column 11 represents items required by scientific program directors of TG 3.1.

SIGNAL PROPERTY TO BE STORED AT ENIWETOK FOR MILITARY POLICE SERVICE COMPANY

ITEM	STOCK NO.	NOMENCLATURE	UNIT	QUANTITY
1	6Z4002	Flashlight, TL–122	ea	42
2	6Z6914–290	Lantern, MX–290/GV	ea	5
3	3H4600–210	Power Unit, PE–210	ea	1
4	2S608/12	Radio Set, SCR–608 complete	ea	1
5	2S628–12.1	RadioSet: SCR–628, SigC except A, 12 V PO 2S628/12	ea	8
6	H015–0500902	Battery, 6 volt, 2H	ea	8

NOTE: Items 5 and 6 were installed on vehicles used by the MP Company.

SIGNAL PROPERTY TO BE STORED AT ENIWETOK FOR TRANSPORTATION PORT COMPANY

ITEM	STOCK NO.	NOMENCLATURE	UNIT	QUANTITY
1	2S300	Radio Set SCR–300	ea	2
2	2S25019	Radio Set AN/–GRC–9 complete w/installation unit	ea	1
3	4B5008	Telephone EE–8	ea	1
4	6Z4002D	Flashlight TL–122	ea	24
5	6Z6914–290	Lantern	ea	5

NOTE: Items 1 and 2 were used in ship-to-shore communications net.

[redacted]

Appendix IV

PRESERVATION AND DISPOSITION OF COMMUNICATIONS EQUIPMENT AND EXPENDABLE SUPPLIES ON ENIWETOK ATOLL

1. The plan for preservation and disposition of communications equipment and expendable supplies on Eniwetok Atoll was devised to process for long-term storage, all communications supplies on Eniwetok Atoll except:

a. Equipment that will be kept operational for use by the garrison force.
b. Equipment that will be determined excess to the needs of future tests.
c. Equipment that is critically short or required for other operations in other locations.

2. At the conclusion of the initial survey it was intended that all required supply action be initiated by the Sacramento Signal Depot. Consequently, requirements were developed and sources of supply, Army, Navy, Air Force and commercial, were ascertained during the period 26 March to 4 April. Request for funds in the amount of $25,000 was initiated by telephone to the Chief Signal Officer on 2 April. It was intended that most items procured, other than items available at the Sacramento Signal Depot, be shipped to Sacramento for checking and re-shipment to the Naval Supply Center, Oakland, California. It was further planned to have all items shipped to arrive at SFPOE by 25 April for waterborne shipment on a vessel scheduled for sailing on 30 April to Eniwetok. Message 87728 dated 6 April 1951, from SIGDB–4, suspended supply action and made it necessary to submit a written plan in final form. Approval of the plan was received 26 April and funds were made available 25 April by message 241900Z April, from SIGDB–3. The target date for activation of subject phase of the roll-up plan remained as 15 May.

3. Supply and transportation problems created by the three-week delay in a planned schedule, already tight, were very considerable. No possibility remained for extra checking at this depot and shipment by water. Supply actions had to be initiated by the fastest possible means and all shipments had to be air-lifted.

4. All supply action was initiated by 10 May and supplies had begun to move into Travis Air Force Base about 6 May. Actual airlift began approximately 14 May. Shipment totals involved:

a. Weight	49,000 pounds
b. Cube	2,340 cu. ft.
c. Pieces	326
d. Line Items	121

5. It was essential that a specialist in the field of spraying vinyl plastics for creating cocoon type vapor-proof barriers be obtained. Two Signal Corps men originally considered could not be made available. Therefore, arrangements were made with the San Francisco Naval Shipyard for the loan of Mr. Fred C. Malz to JTF–3 for the project. On 15 May, Lt. Col. W. E. Thomas Jr., and Mr. Malz departed from Travis AFB reporting for duty at Eniwetok on 20 May.

6. The packaging program, as outlined in the approved plan, was followed quite closely. The principal deviation consisted of packaging more units in place, rather than to spray entire buildings. The Communications Center and the Cryptographic vault on Parry Island, Building #221, were cocooned as planned. No other buildings were done. This resulted in a considerable saving of the cocoon solution No. 5049. About 1,200 gallons were used, leaving 900 gallons which are available for maintenance and a second roll-up of similar scope.

[redacted]

7. Some short delays in critically needed items handicapped the actual operation, but actually all required items were received with the exception of the 10 dehumidifying machines and 20 humidistats ordered through BuShips, Washington, D. C., on 10 May. These two items were not received prior to departure from Eniwetok of Mr. Malz and Lt. Col. Thomas on 10 June. All necessary arrangements were made for their installation by the garrison force, Signal Corps and Air Force.

8. A summary of the packaging accomplished is as follows:

a. Signal Corps. A total of 25 package units were completed with a total package surface area of 11,760 sq. ft. These packages are designated and located as follows:

(1) Eniwetok Island.

Package Number	*Bldg.*	*Content*
S1	3	PE-215-E Power Unit
S2	512	PE-95-G Power Unit
S3	84	PE-95-G Power Unit
S4	85	Receivers
S5	85	Receivers
S6	83	Power Panel
S7	83	K-52 Trailer & PE-95 Power Unit
S8	83	K-52 Trailer & PE-95 Power Unit
S9	83	K-53 Van with AN/TRC-3 Equipment
A through N	83	Separate tiers of 9 Box pallets each containing warehouse stocks.

(2) Parry Island

Communications Center and cryptographic vault, each containing equipment stored in a bare state.

b. Air Force (AACS). A total of 28 package units were completed with a total package surface of 7,990 sq. ft. These packages are all on Eniwetok Island and located and numbered as follows:

Package Number	*Bldg.*	*Content*
1	3	Diesel Power Unit (outside)
2	4	Transmitters
3	4	Transmitters
4 through 8	106	Radar Equipment
9 through 12	138	Diesel Power Units
13	138	Side Panels for Power Units
14 through 17	89	Radio Teletype Equipment
18	90	Ozalid Machine
19	90	Receiver-Transmitter Bank
20	90-B	Receivers
21, 22, 23	90-C	Cummings Diesel Power Units
24	90-C	Power Panel
25, 26, 27	90-C	Cooling Fans
28	Mobile	SCR-545 Van

c. Package groups piped together and designed for humidity control by means of the Navy package dehumidifier are as follows:

(1) Signal Corps
   (a) Packages S7, S8, S9 and G through K in Bldg. #83.
   (b) Packages A through F and L, M and N also in Bldg. #83.
   (c) The Comunications Center and the cryptographic vault in Bldg. #221 on Parry Island.

(2) Air Force (AACS)
  (a) Packages 14 through 17 in Bldg. #89.
  (b) Packages 21 through 27 in Bldg. #90–C.

d. Humidity control in all other packages was planned for a dessicant (silica gel). Due to the fact that the de-humidifying machines did not arrive on time humidity was reduced in all packages by means of silica gel. However, a sufficient quantity was not available to reduce humidity in all packages to the control point of 30%. Those planned for control by silica gel alone were reduced to a relative humidity of 26% to 34%. The package groups were reduced to 35% to 55%. Instructions left with the garrison force were to further reduce these when the dehumidifiers arrived or to withdraw and bake the silica gel, replacing it as it was re-activated until the control point of 30% was achieved. A baking oven was built, but not yet placed in operation. A baking oven in the station hospital was being used to re-activate small quantities.

9. All supplies were ordered under TG 3.2 S O requisition numbers and received to TG 3.2 records. Equipment and supplies were left for use by the garrison force, both Signal Corps and Air Force. All items not required by the garrison force were to be stored properly for use on possible future roll-ups. In accordance with message 130310Z July 51 received from CTG 3.2 Eniwetok, it is understood that cost accounting requirements have already been accomplished. Copies of property issue slips for expendable supplies used for Signal Corps and Air Force packages were obtained. These indicate an expenditure of $3,709.50 for supplies utilized on Signal Corps packages and $2,338.08 for supplies utilized on Air Force packages. These property issue slips do not include the 3 inch galvanized pipe utilized for package groups although it was suggested the piping be expended to completion of the packages. Also, it is noted that the humidity indicators, Stock No. 956–050–500, were deleted from the Air Force property issue slip, but not from the Signal Corps. These are non-expendable instruments and should be issued on memorandum receipt to both accounts. A total of about 40 were utilized.

10. It is believed definitely that the packaging will prove successful and that all equipment will be ready for operation when packages are opened. Complete success is, of course, dependent upon final accomplishment of remaining details by the garrison force and close surveillance and control of humidity. As discussed in paragraph 8d, reduction in relative humidity to 30% in all packages was not achieved prior to departure of supervisory personnel. However, garrison personnel had been trained and given necessary instructions to enable them to level out relative humidity in all packages at 28% to 30%. As packages were completed, readings of relative humidity were taken twice daily and recorded. By 10 June, data for 11 days were available on the first packages. Readings were very constant and no evidence of leakage in any packages was found. This is, of course, for a very short period. As previously stated, these data were left with the garrison force to be incorporated in the final record of humidity and temperature readings.

11. All equipment that had been in service or had any evidences of deterioration while in storage was processed by the field maintenance personnel. Equipment was not accepted for storage unless by visual inspection it appeared to be in satisfactory condition. Rejects were returned to maintenance personnel for additional processing. A brief inspections form was devised for use in making visual inspections of equipment. This form was filled out and placed with the equipment inside the package just prior to sealing the package. The intended purpose of the form is to enable personnel opening packages to determine whether any additional corrosion has occurred during the storage period.

12. A great deal of the packaging done should remain intact when opening up for future operations. Personnel assigned to open packages should be instructed to study each package with this in mind, prior to opening. Due to time limitations imposed and untrained personnel that had to be utilized, it was not practicable to design framing on a "sectional pre-fabricated" bases to be bolted together. This should be considered for future operations. However, a

great many of the packages need not be destroyed when opened. They should be cut open where necessary to gain access to equipment and enable its proper operation. Panel sections can be rolled or folded up and retained for the Roll-up phase. When rolling-up after an operation, these sections can be taped into the original package structure and sealed by spraying the seams. A light coat sprayed over the entire package will help to preserve the flexibility, strength and durability of the vapor-proof barrier.

13. Packages should not be opened until equipment is needed. When opened, qualified inspectors should be on hand to check the condition of equipment, match this against the information on the inspection forms attached to the equipment and make appropriate notes to record the effectiveness of the entire operation.

14. Final decision as to effectiveness and economy of this program should be withheld until another operation. There are many improvements that can be made. These will become apparent with study and experience. However, as previously stated it is believed the overall program will prove successful.

REQUIREMENTS FOR PACKAGING AND PROCESSING EQUIPMENT

STOCK NUMBER	NOMENCLATURE	UNIT COST	TOTAL COST	U/M	QUANTITY	SOURCE
N/L	Hose, Air 7/16″ I.D. x 50′ 2 braid Devillbiss H-1903-1110 W/5/8″-18 HC-434 connectors both both ends	$15.00	$90.00	ea	6	Local Purchase
N/L	Air Transformer, Devillbiss Type HLC-603	55.00	165.00	ea	3	Local Purchase
N/L	Hose, Air 7/16″ ID x 25′ 2 Braid, Devillbiss H-1903-1110 W/9/16″-20 HC-444 Connections both ends	7.50	45.00	ea	6	Local Purchase
N/L	Hose, fluid, 3/8″ x 25′ Devillbiss H-1907-2015 W/5/8″-18 HC-434 fitting one end and 9/16″-20 HC-444 other end	7.50	45.00	ea	6	Local Purchase
N/L	Gun, spray, Devillbiss MBC-510 W/No. 765 Air cap and Ex. fluid tip	44.00	352.00	ea	8	Local Purchase
N/L	Kit, spare parts for MBC spray gun Devillbiss KK-658	6.00	24.00	ea	4	Local Purchase
N/L	Tank, pressure feed, 15 gal, complete w/agitator, air motor drive, air regulator and 2 fluid and 2 air outlets Devillbiss QM-5665	200.00	800.00	ea	4	Local Purchase
N/L	Spray system, complete for spraying of heavy mastic, Devillbiss QBD-611	150.00	150.00	ea	1	Local Purchase
N/L	Tank, pressure feed, 5 gal w/agitator air motor drive, air regulator, 2 air outlets and 2 fluid outlets Devillbiss QM-5663	165.00	330.00	ea	2	Local Purchase
N/L	Truck, castered, Devillbiss, QF-503	15.00	90.00	ea	6	Local Purchase
N/L	Suction Feed, cup 1 qt aluminum w/connections for MBC spray gun Devillbiss KR-505	6.00	12.00	ea	2	Local Purchase
N/L	Respirator, Cartridge type Devillbiss MSC-501	10.00	120.00	ea	12	Local Purchase
N/L	Insert container, 15 gal w/cover Devillbiss QM-483	3.00	12.00	ea	4	Local Purchase
N/L	Insert container, 15 gal w/cover Devillbiss QM-404	5.00	40.00	ea	8	Local Purchase
N/L	Air Cap, Devillbiss No. 203	2.00	10.00	ea	5	Local Purchase
	CALIBRATING EQUIPMENT					
7A1324	Psychrometer ML-24, Hand Sling Type	5.00	15.00	ea	3	Signal Corps
7A1745	Tables Psychrometric	.15	.45	ea	3	Signal Corps
7A1324/4	Wich for psychrometer	.05	.50	ea	10	Signal Corps
N/L	Meter, moisture, Hart Moisture Meter Co. Type K-103 or equal. 110/120V. 50.60 cy AC	350.00 (Est)	350.00	ea	1	Hart Moisture Meters, Grand Central Terminal Bldg., New York NY

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REQUIREMENTS FOR PACKAGING AND PROCESSING EQUIPMENT (*Continued*)

STOCK NUMBER	NOMENCLATURE	UNIT COST	TOTAL COST	U/M	QUANTITY	SOURCE
	PAN FABRICATING EQUIPMENT					
6R24011	Snips, tin, straight jaw	$2.00	$4.00	ea	2	Signal Corps
6R24010	Snips, tin, curved jaw	2.50	5.00	ea	2	Signal Corps
6Q34811	Drill, electric ¼″ cap	35.00	70.00	ea	2	Signal Corps
6Q36160.1	Drill Set #1 to #60 high speed	20.00	40.00	ea	2	Signal Corps
	MISCELLANEOUS TOOLS					
41-K-490	Knife, linoleum, curved blade	.50	3.00	ea	6	Q.M.
41-K-546	Knife, putty 1¼″ x 3½″ blade w/3½″ handle	1.00	6.00	ea	6	Q.M.
41-S-5966	Stretcher, steel strapping ¾″	10.00	10.00	ea	1	Q.M.
41-S-2071	Sealer, strapping, hand operated SIGNODE ¾″	10.00	10.00	ea	1	Q.M.
41-M-248-125	Machine, stapler, heavy duty Duofast CT-30	10.00	20.00	ea	2	Q.M.
6Q16501	Caliper, micrometer	8.00	16.00	ea	2	Signal Corps
6R21114	Shears, tailors, TL-363/U	8.00	16.00	ea	2	Signal Corps
6Z1582	Brush, paint, 2″	1.25	12.50	ea	10	Signal Corps
6Z1553	Brush, paint, 3″	5.00	50.00	ea	10	Signal Corps
N/L	Heat Sealer, Simplex hand type	6.00	120.00	ea	2	Signal Corps
N/L	Spigot, molasses type 2″ pipe thread	3.00	12.00	ea	4	Local Purchase
N/L	Spigot, oil type ¾″ pipe thread	1.50	6.00	ea	4	Local Purchase
N/L	Marker, fountain pen type, pocket size Marsh Co. #77	2.44	24.40	ea	10	Local Purchase
N/L	Blower, hot air, Ideal Communtator & Dresser Co. Mo. H & C	35.00	140.00	ea	4	Local Purchase
N/L	Saw, electric portable, 7″ Black & Decker Co. #75 110 V. or equal	125.00	125.00	ea	1	Local Purchase
N/L	Sander, electric, portable 7″ Black & Decker Co. 7″ or equal 110 v.	60.00	60.00	ea	1	Local Purchase
8100-404225	Hammer, pneumatic riveting ¼″ cap. Chicago Pneumatic CP-4X w/6 rivet blanks	35.00	70.00	ea	2	Air Force
6R36026	Tape, measuring, 100 ft length	5.00	5.00	ea	1	Signal Corps
6R9629	Tape, measuring, 6 ft length	.55	3.30	ea	6	Signal Corps

NOTE In addition to above, dehumidifying equipment, controls and piping are needed. Information as to availabilitv, stock numbers, etc., is not available at this time.

REQUIREMENTS FOR EXPENDABLE PACKAGING SUPPLIES (EXCLUDING LUMBER)

STOCK NUMBER	NOMENCLATURE	UNIT COST	TOTAL COST	U/M	QUANTITY	SOURCE
961-285-250	Aluminum sheets 4′ x 12′ x .032	$6.75	$843.75	ea	125	SacSigDep
961-285-230	Aluminum sheets 3′ x 7′ x .025	2.25	56.25	ea	25	"
967-000-100	Paper, wrapping, Grade A Type 1, 36″	15.00	375.00	Ro	25	"
966-004-550	Tape, acetate fibre 3″ x 72 yd	2.37	142.20	ro	60	"
962-000-050	Paper, corrugated 48″ back single face	5.62	140.50	ro	25	"
955-003-040	Wadding, cellulose 40″ x 110′ x .50	12.47	124.43	ro	10	"
963-000-000	Compound, calking EC-612	.69	138.00	lb	200	"
956-050-000	Indicator, humidity	7.50	75.00	ea	100	"
966-006-950	Tape, mystic 4″	4.40	44.00	ro	10	"
961-102-660	Nail common coated 16d	.04	4.00	lb	100	"
961-102-600	Nail, common coated 8d	.05	10.00	lb	200	"
961-102-680	Nail, common coated 20d	.04	4.00	lb	100	"
961-102-580	Nail, common coated 6d	.05	5.00	lb	100	"
964-001-000	Methanol 95% anhydrous neutral water white	.56	61.60	gal	110	"
963-003-160	Compound, rust prev. thing grd. 14C-507-10 Film AXS-673	.50	25.00	gal	50	"
952-073-580	Pouch FL. C.B. 3¾″ x 7″	.024	4.80	ea	2000	"
952-081-380	Pouch Fl. C.B. 5¾″ x 7″	.048	2.48	ea	500	"
952-092-180	Pouch Fl. C.B. 10½″ x 8½″	.114	2.28	ea	200	"
952-084-980	Pouch, Fl. C.B. 7″ x 8″	.066	3.30	ea	500	"

REQUIREMENTS FOR EXPENDABLE PACKAGING SUPPLIES (EXCLUDING LUMBER) *(Continued)*

STOCK NUMBER	NOMENCLATURE	UNIT COST	TOTAL COST	U/M	QUANTITY	SOURCE
952-102-380	Pouch Fl. C.B. 23″ x 23″	$.72	$7.20	ea	100	"
952-113-080	Pouch Fl. P.B. 2¾″ x 4¼″	.010	2.50	ea	2500	"
952-113-680	Pouch Fl. P.B. 3″ x 4″	.015	2.25	ea	1500	"
952-115-280	Pouch Fl. P.B. 4″ x 5″	.020	2.00	ea	1000	"
952-119-280	Pouch Fl. P.B. 4¾″ x 8″	.025	2.50	ea	1000	"
952-121-700	Pouch Fl. P.B. 5″ x 12″	.030	3.00	ea	1000	"
952-123-680	Pouch Fl. P.B. 6″ x 7″	.025	2.50	ea	1000	"
952-137-880	Pouch Fl. B.B. 14½″ x 20″	.15	3.00	ea	200	"
953-000-300	Barrier, metal foil Cl. B. Type 1, Class A 36″	110.00	220.00	ea	2	"
957-038-885	Box, fibre, corrugated W-SC RSC 4″ x 4″ x 4″	.039	7.80	ea	200	"
957-038-900	Box, fibre W-5C RSC 5″ x 5″ x 5″	.043	4.30	ea	100	"
957-038-975	Box, fibre 6″ x 6″ x 4″ W-5C RSC	.030	3.00	ea	100	"
957-039-600	Box, fibre 10″ x 8″ x 6″ W-5C RSC	.087	17.40	ea	200	"
957-040-600	Box, fibre 12″ x 12″ x 14″ W-5C RSC	.184	18.40	ea	100	"
957-041-825	Box, fibre 18″ x 18″ x 14″	.260	26.00	ea	100	"
957-060-900	Box, fibre 21″ x 18″ x 12″	.372	55.50	ea	150	"
956-000-700	Silica gel 15 Gr.	.01	9.00	ea	900	"
956-000-200	Silica gel 8 oz.	.12	48.00	ea	400	"
956-000-100	Silica gel 1 lb.	.21	56.70	ea	270	"
960-013-300	Tag, shipping w/wire 5¼″ x 2⅝″	.0019	1.90	ea	10000	"
968-009-005	Can, metal 5 gal	1.28	6.40	ea	5	"
968-009-010	Can, metal 10 gal.	2.15	10.75	ea	5	"
962-002-250	Paper, kraft 36″	2.85	5.70	ro	2	"
965-005-160	Staples, Duofast #308	1.65	8.25	Bx	5	"
965-002-880	Seals, Strapping ¾″	.38	1.90	c	5	"
965-008-310	Strapping ¾″	.09	9.00	lb	100	"
6700-502600	Rivets, aluminum alloy R.H. ¼″ long ⅛″ d	5.00	5.00	lb	1	McClellan AFB
N/L	Cocoon webbing agent #4919	2.50	125.00	*gal	50	R. M. Hollingshead Corp, Camden, NJ
N/L	Cocoon solution cocoon #5049	3.75	7875.00	*gal	2100	R. M. Hollingshead Corp, Camden, NJ
N/L	Cocoon cleaning solvent #5189	1.75	175.00	*gal	100	R. M. Hollingshead Corp, Camden, NJ
N/L	Dye, red cocoon #4946	5.25	63.00	gal	12	R. M. Hollingshead Corp, Camden, NJ
N/L	Glue, pliobond cocoon sealing compound #4927	4.25	42.50	gal	10	R. M. Hollingshead Corp, Camden, NJ
N/L	Cocoon vinylite inspection windows 10″ x 10″ x .06 approx.	2.00	200.00	ea	100	R. M. Hollingshead Corp, Camden, NJ
N/L	Cocoon black mastic #5119	1.30	130.00	*gal	100	R. M. Hollingshead Corp, Camden, NJ
956-000-000	Silica gel 5 lb	.25	6250.00	lb	25000	Local proc.
964-005-020	Solvent, Stoddard	.21	57.75	gal	275	Local Proc.
963-006-180	Oil, medium AXS-764-USA-2-122	.75	112.50	gal	150	Local Proc.
N/L	Disc sanding aluminum oxide grit No. 36 7″ diameter ½″ hole	.40	20.00	ea	50	Local Purchase

* In 50 gal. drums.

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ROLL-UP SUPPLIES REQUISITIONED BY SIGNAL OFFICER, TASK GROUP 3.2

REQUISITION NUMBER WREN-I-SIG-1.1—SAC-WAB

10 Drums (5 Gal. Ea) Synthetic Resin Red Label

42 Drums (50 Gal. Ea) Synthetic Resin Red Label

2 Drums (50 Gal. Ea) Liq. Cleaning Compd. No. 1 Bn Red Label

2 Wood Cases (6-1 Gal. Jugs Ea) Coal Tar Dye Red Label in Glass

2 Drums (50 Gal. Ea) Asphaltum

2 Drums (5 Gal. Ea) Liq. Glue No. 1 Bn Red Label

1 Carton (50 Ea) Laminated Plastic Sheets (Window Pane)

EQUIPMENT AVAILABLE AT ENIWETOK FOR SUBJECT PROGRAM

Item	Number Required
1. Fork lift trucks, short boom	2
2. Truck, 2½ ton	1
3. Jeep	1
4. Air compressor, truck mounted, 105	1
5. Air compressor, portable	2
6. Portable A frame, 3 ton	1
7. Chain hoist, 3 ton	1
8. Steam cleaner, portable	1
9. Sheet metal break	1

10. Box and crate shops are operated by the Engineer Supply Section and the Air Force. These ships provide cut-off saws, a jig saw, a band saw, and a jointer. These shops will be available for limited amounts of work.

Appendix V

Wire Circuit Assignment

Section I

ENIWETOK ISLAND

WIRE CIRCUIT ASSIGNMENT

[redacted]

WIRE CIRCUIT ASSIGNMENT CHART
Eniwetok Island

FROM	TO	PURPOSE	CKT NO.	ASSIGNED CHANNEL	REMARKS VOLTAGE
			1		
			2		
			3		
			4		
AOC	Eniwetok Swbd	Trunk Circuit	5	C8–13XC17–9	0
			6		
			7		
			8		
			9		
MDF	Comm Center	20 Cycle Ringing for AN/TRC	10	C5–51	90V. AC
			11		
			12		
Comm Center	Bldg 90	Teletype	13	C5–25XC15–95	135V
Hq Bldg	MP Det	Bomb Warning Sig	14	C4–12XC7–6	2V
MDF	Bldgs 4, 29, 14, 69, and 118	Sirens	15	C1–6XC7–10XC2–10	45V DC
Bldg 24	Air Force Tower	Emerg Ambulance	16	C9–21XC8–41	0
Comm Center	Bldg 89	Teletype	17	C5–43XC8–46	135V
Bldg 85	Radio Sta	Audio Line	18	C6–20XC11–35	42V
Bldg 85	MDF	Emergency L A	19	C8–39XC11–13	
Bldg 85	MDF	Emergency Oahu	20	C8–40XC11–14	
Bldg 89	Bldg 85	Mon Cir J–61	21	C13–27XC11–11	135V
Bldg 89	Bldg 85	Mon Cir J–61	22	C13–28XC11–12	135V
			23		
			24		
			25		
			26		
			27		
Bldg 137	Bldg 85	Shock Wave Recdr	28	C16–20XC11–6	0
			29		
Comm Center	Bldg 85	Los Alamos Rec	30	C5–5XC11–27	135V
Comm Center	Bldg 85	Oahu Rec	31	C5–7XC11–28	135V
Bldg 4	Bldg 85	Oahu Keying Line	32	C2–20XC11–29	2V
Bldg 4	Bldg 85	Kwaj Keying Line	33	C2–21XC11–30	2V
Bldg 4	Bldg 85	Ship to Shore Line Keying Line	34	C2–22XC11–31	2V
Bldg 4	Bldg 85	EE–8 Tel Line	35	C2–23XC11–32	0
Bldg 4	Bldg 85	Ship to Shore Line Keying Line (Voice)	36	C2–24XC11–33	2V
Bldg 85	Port Office	Ship to Shore Line Modulating	37	C11–34XC4–11	
			38		
Comm Center	Bldg 85	Teletype	39	C5–3XC11–37	135V
Comm Center	Bldg 85	Los Alamos Keying	40	C5–4XC11–41	135V
Bldg 85	Bldg 4	Los Alamos Keying	41	C11–40XC2–15	135V
Comm Center	Bldg 85	Oahu Keying	42	C5–6XC11–43	135V
Bldg 85	Bldg 4	Oahu Keying	43	C11–42XC2–16	135V
Bldg 85	Bldg 4	Spare Keying	44	C11–44XC2–1	135V
Bldg 85	Bldg 4	Spare Keying	45	C11–45XC2–2	135V
Bldg 85	Bldg 4	Emerg Keying Line	46	C11–46XC2–18	135V
Bldg 85	Bldg 4	Emerg Keying Line	47	C11–47XC–2–19	135V
Bldg 85	Bldg 4	Spare Keying	48	C11–48XC2–3	135V
Bldg 85	Comm Center	EE–8 Tel Line	49	C11–49XC5–41	0
Bldg 89	Bldg 4	Ground	50	C13–33XC10–1	0
Bldg 89	Bldg 4	Kwaj Keying Line	51	C13–34XC10–2	2V
Bldg 89	Bldg 4	Spare Keying	52	C13–35XC10–3	2V
Bldg 89	Bldg 4	Kwaj Keying	53	C13–36XC10–4	2V
Bldg 89	Bldg 4	Kwaj Keying	54	C13–37XC10–5	2V

[redacted]

WIRE CIRCUIT ASSIGNMENT CHART (*Continued*)

FROM	TO	PURPOSE	CKT NO.	ASSIGNED CHANNEL	REMARKS VOLTAGE
Bldg 89	Bldg 4	Kwaj Keying	55	C13–40XC10–6	2V
Bldg 89	Bldg 4	Kwaj Keying	56	C13–41XC10–7	2V
Bldg 89	Bldg 4	Kwaj Keying	57	C13–42XC10–B	2V
Bldg 89	Bldg 4	Kwaj Keying	58	C8–18XC2–38	2V
Bldg 89	Bldg 4	Spare Keying	59	C8–19XC2–39	2V
			60		
			61		
Bldg 89	Bldg 4	Keying Line Carrier Bay	62	C8–22XC2–42	135V
Bldg 89	Bldg 4	Keying Line, VF Carrier Bay	63	C8–23XC2–43	135V
Bldg 89	Bldg 4	Keying Line, VF Carrier Bay	64	C8–24XC2–44	135V
Bldg 89	Bldg 4	Kwaj Keying	65	C8–25XC2–45	2V
Bldg 89	Bldg 4	Kwaj Keying	66	C8–26XC2–46	2V
Bldg 89	Bldg 4	Kwaj Keying	67	C8–27XC2–47	2V
Bldg 89	Bldg 4	Stand-By Cir 86	68	C8–28XC2–48	2V
Bldg 89	Bldg 4	Homer Keyer	69	C8–29XC2–49	2V
Bldg 89	Bldg 4	Spare Keying	70	C8–30XC2–50	2V
			71		
Bldg 89	Bldg 4	Spare Keying	72	C8–32XC2–28	2V
			73		
			74		
Bldg 77	Bldg 89	AF Supply (Local)	75	C14–9XC13–9	0
Bldg 77	Bldg 89	Teletype	76	C14–14XC13–14	135V
			77		
			78		
			79		
Bldg 89	Bldg 135	Teletype	80	C13–13	135V
			81		
			82		
			83		
Bldg 89	Bldg 4	Audio 6830	84	C13–10XC10–10	2V
Bldg 89	Bldg 4	Audio 3190 & 9630	85	C13–11XC10–11	2V
Bldg 89	Bldg 4	Audio 4765	86	C13–12XC10–12	2V
			87		
			88		
			89		
			90		
			91		
			92		
			93		
Bldg 89	Bldg 4	EE–8 Tel Line	94	C13–20XC10–20	0
Bldg 89	Bldg 4	Teletype	95	C13–30XC10–21	135V
Bldg 89	Bldg 4	Keying Line (Local)	96	C13–31XC10–22	0
			97		
			98		
			99		
			100		
AOC	Parry	Telephone	101	C17–1XC103–11	0
AOC	Parry	Telephone	102	C17–2XC103–9	0
Bldg 15	Parry	Telephone	103	C3–25XC103–10	0
Bldg 15	Parry	Telephone	104	C3–23XC102–10	0
Weather Station	Parry	Teletype	105	C19–15XC103–12	135V
Weather Station	Parry	Voice	106	C19–6XC103–8	0
AOC	Parry Exchange	Trunk Circuit	107	C17–7XC103–6	0
AOC	Parry	USS Curtiss (Voice)	108	C17–8XC103–14	0
			109		
			110		
			111		
			112		

[redacted]

WIRE CIRCUIT ASSIGNMENT CHART (*Continued*)

FROM	TO	PURPOSE	CKT NO.	ASSIGNED CHANNEL	REMARKS VOLTAGE
Comm Center	Parry	JTF-3 Teletype	113	C5-14XC102-5	135V
Comm Center	Parry	JTF-3 Teletype	114	C5-15XC102-6	135V
			115		
			116		
Sta 775	Parry	Timing Signal	117	C2-31XC103-13	0
Sta 775	Parry	Timing Signal	118	C2-32XC103-15	0
Comm Center	Parry	Teletype	119	C5-35XC101-12	135V
Comm Center	Parry	Teletype	120	C5-36XC101-4	135V
Sta 775	Parry	Timing Signals	121	C2-33XC103-16	0
Liaison Dispatch	Parry	Direct Line	122	C13-19XC101-10	0
GCI	Parry	Voice Timing Rebroadcast	123	C17-4XC102-12	12V
Bldg 90	USS Curtiss	Teletype	124	C15-3XC101-11	135V
Bldg 90	Parry	Voice Line	125	C15-32XC101-2	0
			126		
Officers Beach Club	Parry	Voice (PA System)	127	C2-73XC101-3	20V
			128		
			129		
			130		
			131		
			132		
			133		
			134		
			135		
			136		
			137		
			138		
			139		
Comm Center	Parry	Los Alamos (Send)	140	C5-29XC101-7	135V
Comm Center	Parry	Los Alamos (Rec)	141	C5-30XC101-9	135V
Comm Center	Parry	Oahu (Send)	142	C5-27XC101-5	135V
Comm Center	Parry	Oahu (Rec)	143	C5-28XC101-6	135V
			144		
			145		
			146		
			147		
			148		
			149		
			150		
Bldg 90	Bldg 135	Crash Fire Alarm	151	C12-1XC15-52	0
Bldg 90	Bldg 135	Crash Fire Alarm	152	C12-2XC15-53	0
Bldg 90	Bldg 135	Crash Fire Alarm	153	C12-3XC15-54	0
Bldg 90	Bldg 135	Crash Fire Alarm	154	C12-4XC15-55	0
Bldg 90	Bldg 135	Crash Fire Alarm	155	C12-5XC15-56	0
Bldg 90	Bldg 135	Crash Fire Alarm	156	C12-6XC15-57	0
Bldg 90	Bldg 135	Crash Fire Alarm	157	C12-7XC15-58	0
Bldg 90	Bldg 135	Crash Fire Alarm	158	C12-8XC15-59	0
Bldg 90	Bldg 135	Crash Fire Alarm	159	C12-9XC15-60	0
Bldg 90	Bldg 135	Crash Fire Alarm	160	C12-10XC15-61	0
Bldg 90	Bldg 135	Crash Fire Alarm	161	C12-11XC15-62	0
Bldg 90	Bldg 135	Crash Fire Alarm	162	C12-12XC15-63	0
Bldg 90	VHF Site	Crash Fire Alarm	163	C16-1	0
Bldg 90	VHF Site	Crash Fire Alarm	164	C16-2	0
Bldg 89	VHF Site	Crash Fire Alarm	165	C16-3	0
Bldg 89	VHF Site	Crash Fire Alarm	166	C16-4	0
Bldg 89	VHF Site	Crash Fire Alarm	167	C16-5	0
Bldg 89	VHF Site	Crash Fire Alarm	168	C16-6	0
Bldg 89	VHF Site	Crash Fire Alarm	169	C16-7	0

WIRE CIRCUIT ASSIGNMENT CHART (*Continued*)

FROM	TO	PURPOSE	CKT NO.	ASSIGNED CHANNEL	REMARKS VOLTAGE
Bldg 89	VHF Site	Crash Fire Alarm	170	C16–8	0
Bldg 89	VHF Site	Crash Fire Alarm	171	C16–9	0
Bldg 89	VHF Site	Crash Fire Alarm	172	C16–10	0
Bldg 89	VHF Site	Crash Fire Alarm	173	C16–11	0
Bldg 89	VHF Site	Crash Fire Alarm	174	C16–12	0
			175		
Bldg 89	Weather Sta	Crash Fire Alarm	176	C18–5XC12–13	0
Bldg 89	Weather Sta	Crash Fire Alarm	177	C18–6XC12–14	0
Bldg 89	Weather Sta	Crash Fire Alarm	178	C18–7XC12–15	0
Bldg 89	Weather Sta	Crash Fire Alarm	179	C18–8XC12–16	0
Bldg 89	Weather Sta	Crash Fire Alarm	180	C18–9XC12–17	0
Bldg 89	Weather Sta	Crash Fire Alarm	181	C18–10XC12–18	0
Bldg 89	Weather Sta	Crash Fire Alarm	182	C18–11XC12–19	0
Bldg 89	Weather Sta	Crash Fire Alarm	183	C18–12XC12–20	0
Bldg 89	Weather Sta	Crash Fire Alarm	184	C18–13XC12–21	0
Bldg 89	Weather Sta	Crash Fire Alarm	185	C18–14XC12–22	0
Bldg 89	Weather Sta	Crash Fire Alarm	186	C18–15XC12–23	0
Bldg 89	Weather Sta	Crash Fire Alarm	187	C18–16XC12–24	0
Bldg 89	Bldg 90	Crash Fire Alarm	188	C19–2XC15–77	0
Bldg 89	Bldg 90	Crash Fire Alarm	189	C19–3XC15–78	0
Bldg 89	Bldg 90	Crash Fire Alarm	190	C19–4XC15–79	0
Bldg 89	Bldg 90	Crash Fire Alarm	191	C19–5XC15–80	0
Bldg 89	Bldg 90	Crash Fire Alarm	192	C19–6XC15–81	0
Bldg 89	Bldg 90	Crash Fire Alarm	193	C19–7XC15–82	0
Bldg 89	Bldg 90	Crash Fire Alarm	194	C19–8XC15–83	0
Bldg 89	Bldg 90	Crash Fire Alarm	195	C19–9XC15–84	0
Bldg 89	Bldg 90	Crash Fire Alarm	196	C19–11XC15–86	0
Bldg 89	Bldg 90	Crash Fire Alarm	197	C19–12XC15–87	0
Bldg 89	Bldg 90	Crash Fire Alarm	198	C19–13XC15–88	0
Bldg 89	Bldg 90	Crash Fire Alarm	199	C19–18XC15–93	0
Bldg 89	Bldg 90	Crash Fire Alarm	200	C19–19XC15–94	0
Bldg 89	Bldg 90	Teletype	201	C19–21XC15–96	135V
Bldg 89	Bldg 90	Teletype	202	C19–22XC15–97	135V
Bldg 89	Bldg 90	Teletype	203	C19–23XC15–98	135V
Bldg 89	Bldg 90	EE–8 AOC to Tower	204	C15–99	0
Bldg 89	Bldg 90	EE–8 Local Line	205	C15–100	0
Bldg 89	Bldg 90	EE–8 Local Line	206	C15–64XC15–19	0
Bldg 89	VHF Site	DF Radio Control	207	C16–13	0
Bldg 89	VHF Site	DF Radio Control	208	C16–14	0
AOC	Bldg 89	EE–8 Local Line	209	C15–101	0
Bldg 89	VHF Site	DF Radio Control	210	C16–15	0
AOC	Bldg 79	Trunk to BD 72	211	C12–25XC15–91	0
AOC	Bldg 79	Mon Radio Control	212	C12–26XC15–92	0
AOC	Gen Lee	Tel Line	213	C17–25XC9–6	0

[redacted]

Section II

PARRY ISLAND AND ALL OTHER ISLANDS
WIRE CIRCUIT ASSIGNMENT

[redacted]

WIRE CIRCUIT ASSIGNMENT CHART
Parry Island

FROM	TO	PURPOSE	CKT NO.	ASSIGNED CHANNEL	REMARKS
Site "A"	Site "B"				
EXT 78	Bldg 221	Phone	300	0–101–1	Hq, JTF–3 off Eniwetok Swbd
AOC	Bldg 311	Direct Phone	301	0–101–2 X C2B–2	EE–8
Officers Beach Club	Bldg 221	VIP Briefing	302	0–101–3 X C2–4	PA System
TU 3.4.3	Comm Center	TT	303	0–101–4 X C2–186	Receive
Xmter Bldg	Comm Center	RTT	304	0–101–5 X C2–177	To Oahu
Rec Bldg	Comm Center	RTT	305	0–101–6 X C2–178	From Oahu
Xmter Bldg	Comm Center	RTT	306	0–101–7 X C2–179	To Los Alamos
Ext 80	Bldg 221	Phone	307	0–101–8	Hq, JTF–3 off Eniwetok Swbd
Rec Bldg	Comm Center	RTT	308	0–101–9 X 180	From Los Alamos
Ext 82	Bldg 221	Phone	309	0–101–10	
AOC	Site B, C, D, and E Buoys	TT	310	0–101–11 X C2–184 X C2–198 X 2–110–5 X 0–105–13 X 3–116–5 X 0–107–13 X 4–119–1 X 0–109–13 X 0–109A–13 X 5–124–5.	110V 60ma
TU 3.4.3	Comm Center	TT	311	0–101–12 X C2–185	110V 60ma
AOC	Air Strip	Phone	312	0–101–13 X C1–8	EE–8 Direct Phone
Ext 83	Bldg 221	Phone	313	0–101–14	Hq, JTF–3 off Eniwetok Swbd
Ext 84	Bldg 221	Phone	314	0–101–15	Hq, JTF–3 off Eniwetok Swbd
Ext 85	Bldg 221	Phone	315	0–101–16	Hq, JTF–3 off Eniwetok Swbd
Trk 1	Trk 2	Phone	316	0–101–1	Trunk between Parry and Eniwetok
Trk 2	Trk 2	Phone	317	0–101–1	Trunk between Parry and Eniwetok
Ext 86	Bldg 221	Phone	318	0–102–3	Hq, JTF–3 off Eniwetok Swbd
Swbd	Swbd	Spare	319	0–102–4	Spare Trk
TG 3.2 Comm Ctr	Comm Center	TT	320	0–102–5 X C2–194	Send 110V 60 MA
TG 3.2 Comm Ctr	Comm Center	TT	321	0–102–6 X C2–195	Receive 110V 60 MA
Swbd	Swbd	Spare	322	0–102–7	Spare Trk
TG 3.2 Comm Ctr	Comm Center	Half-Duplex	323	0–102–8 X C2–108	
Trk 12 "C"	Trk 8 Center	Phone	324	0–102–9	Trk line between sites
G3 Bldg 15	Oper. Center	Phone	325	0–102–10 X C2–1	Direct Phone G–3 TG 3.2 to JTF–3
Ext 88	Bldg 221	Phone	326	0–102–11	Hq, JTF–3 off Eniwetok Swbd
AOC	Bldg 311	Voice time signal	327	0–102–12 X C3–16	For rebroadcast by 3.4
Test Pair	Test Pair		407	0–102–13 X C2–187	
Test Pair	Test Pair		408	0–102–14 X C2–188	
Ext 76	Bldg 221	Phone	328	0–102–15	Hq, JTF–3 off Eniwetok Swbd
Swbd Main Frame	Bldg 311	Spare	329	0–102–16 X C3–5	Spare line for time sig
Trk 3	Trk 29	Phone	330	0–103–1	Trunk line
Trk 4	Trk 30	Phone	331	0–103–2	Trunk line
Trk 12	Trk 22	Phone	332	0–103–3	Trunk line

WIRE CIRCUIT ASSIGNMENT CHART (*Continued*)

FROM	TO	PURPOSE	CKT NO.	ASSIGNED CHANNEL	REMARKS
Trk 13	Trk 21	Phone	333	0–103–4	Trunk line
Trk 14	Trk 7	Phone	334	0–103–5	Trunk line
Swbd	Swbd	Spare	335	0–103–6	
Ext 91	Bldg 221	Phone	336	0–103–7	Hq, JTF–3 off Eniwetok Swbd
AOC WX	Op Center	Phone	337	0–103–8 X C1–7	Direct phone from TG 3.4
AOC	CP	Phone	338	0–103–9 X C1–8	Direct phone JTF–3 CP to AOC
Bldg 15	CP	Phone	339	0–103–10 X C1–4	Direct phone JTF–3 CP to CTG 3.2
AOC	Op Center	Phone	340	0–103–11 X C1–2	Direct phone JTF–3 Op Ctr to AOC
AOC WX	Op Center	TT	341	0–103–12 X C2–183	110V 60 ma
Station 775	Bldg 311	Time Signals	342	0–103–13 X C3–2	E G & G 30 ma
AOC	Site B, C, D, and E Buoys	Phone	343	0–103–14 X C4–4 X 2–110–4 X 0–105–6 X 3–116–4 X 0–107–10 X 4–119–4 X 0–109–8 X 0–109 A–8 X 5–124–4	AOC to Flag Plot USS Curtiss
Station 775	Bldg 311	Time Signals	344	0–103–15 X C3–3	EG&G 30ma
Station 775	Bldg 311	Time Signals	335	0–103–16 X C3–4	EG&G 30ma
Site "B"					
Trk 25	Site D Trk 4	Phone	336	0–104–1 X 0–107–1	Trk Ckt Parry to Biijiri
Trk 26	Trk 5	Phone	337	0–104–2 X 0–107–2	Trk Ckt Parry to Biijiri
Trk 9	Site E Trk 1	Phone	338	0–104–3 X 0–106–8 X 0–108–1 X 0–108 A–1	Trk Ckt Parry to Engebi
Trk 10	Trk 2	Phone	339	0–104–4 X 0–106–9 X 0–108–2 X 0–108 A–2	Trk Ckt Parry to Engebi
Trk 11	Site E Trk 3	Phone	340	0–104–5 X 0–106–2 X 0–108–3 X 0–108 A–3	Trk Ckt Parry to Engebi
Trk 15	Site C Trk 4	Phone	341	0–104–6	Trk Circuit Parry to Runit
Trk 16	Trk 5	Phone	342	0–104–7	Trk Circuit Parry to Runit
Trk 3 Bldg 311	Sites B, C, D, and E Buoys	Phone	343	2–110–1 X 0–104–8 X 3–116–1 X 0–106–1 X 4–119–1 X 0–108–7 X 0–108A–7 X 5–124–1	EE–8 TG 3.1 Op to TG 3.3 Op
Trk 4 Op Center	Sites B, C, D, and E Buoys	Phone	344	2–110–2 X 0–104–9 X 3–116–2 X 0–106–6 X 4–119–2 X 0–108–11 X 0–108A–11 X 5–124–2	EE–8 JTF–3 Op to TG 3.3 Op
Trk 5	Sites B, C, D, and E Buoys	Phones	345	2–110–3 X 0–104–10 X 3–116–3 X 0–106–7 X 4–119–3 X 0–108–4 X 0–108A–4 X 5–124–3	EE–8 JTF–3 CP to TG 3.3 CP
Swbd	Site C Swbd	Spare	346	0–104–11	
Swbd	Site C Swbd	Spare	347	0–104–12	
Bldg 311	Sites C, D, and E Bldg 69	Telemetering	348	C3–7 X 0–104–13 X 0–106–13 X 0–108–13 X 0–108A–13	EG&G 30ma
Bldg 311	Sites C, D, and E	Telemetering	349	C3–8 X 0–104–14 X 0–106–14 X 0–108–14 X 0–108A–14	EG&G 30ma
Bldg 311	Sites C, D, and E	Telemetering	350	C3–9 X 0–104–15 X 0–106–15 X 0–108–15 X 0–108A–15	EG&G 30ma
Site B Bldg 311	Bldg 69 Sites	Telemetering	351	C3–10 X 0–104–16 X 0–106–16 X 0–10 8–16 X 0–108A–16	EG&G
Bldg 311	Sites C, D, and E Tower	EE–8	352	CIB–2 X 0–105–1 X 0–107–8A–109–2 X 0–109A–2	Dry Line
Trk 23	Site E, Trk 4	Phone	353	0–105–2 X 0–107–3 X 0–109–3 X 0–109 A–3	

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WIRE CIRCUIT ASSIGNMENT CHART (*Continued*)

FROM	TO	PURPOSE	CKT NO.	ASSIGNED CHANNEL	REMARKS
Trk 12	Site D, Trk 1	Phone	354	0-105-3 X 0-106-3	
Trk 13	Site D, Trk 2	Phone	355	0-105-4 X 0-106-4	
Trk 14	Site D, Trk 5	Phone	356	0-105-5 X 0-106-5	
Bldg 310	Site P	Telemetering	357	C2B-1 X 0-105-7 X 0-107-7 X 0-109-11 X	TU 3.1.1 Prog 1 2V. DC
Trk 24	Site E, Trk 5	Phone	358	0-105-8 X 0-107-4 X 0-109-4 X 0-109 A-4	
Bldg 212A	Site E, Sta 12	Telemetering	359	C2A-153 X 0-105-10 X 0-107-12 X 0-109-12 X 0-109A-12	LASL J-3 5V. 20 cycle
Bldg 323	Site C, Sta 69	EE-8	360	C2A-126 X 0-105-11 X 0-107-11 X 0-107-11 X 0-109-6 X 0-109A-6	Dry Line
Trk 28	Site C, Trk 7	Phone	361	0-105-12	
Control Bldg 311	Site C&D	Telemetering	362	C3-12 X 0-105-14 X 0-107-14	EG&G 30ma
Control Bldg 311	Site C&D	Telemetering	363	C3-13 X 0-105-15 X 0-107-15	EG&G 30ma
Control Bldg 311	Site C&D	Telemetering	364	C3-14 X 0-105-16 X 0-107-16	EG&G 30/ma
Site C	Site D				
Swbd	Swbd	Spare	365	0-106-10	
Trk 8	Trk 8	Phone	366	0-106-11	
Trk 1	Site E Trk 6	Phone	367	0-106-12 X 0-109-9 X 0-108A-9	
Trk 9	Site D Trk 9	Phone	368	0-107-5	
Trk 10	Site E Trk 10	Phone	369	0-107-6	
Trk 2	Site E Trk 7	Phone	370	0-107-7 X 0-109-7 X 0-109-7 X 0-109A-7	
Trk 3	Site E Trk 8	Phone	371	0-107-9 X 0-109-5 X 0-109A-5	
Swbd	Site D Swbd	Spare	372	0-107-12 X	
Site D					
R Gd	Site E R Gd	Phone	373	0-108-5 X 0-108A-5	
Swbd	Site E Swbd	Spare	374	0-108-6 X 0-108A-6	
Swbd	Site E	Spare	375	0-108-8 X 0-108A-8	BAD
Sta 29	Site P, Sta 29	EE-8	376	0-108-10	Dry Line
Trk 6	Site E, Trk 9	Phone	377	0-109-1 X 0-109A-1	
Trk 9	Site E, Trk 9	Phone	378	0-109-5 X 0-109A-5	
Trk 7	Site E, Trk 7	Phone	379	0-109-7 X 0-109A-7	
Sta 3	Site P, Sta 3	EE-8	380	0-109-9	Dry Line
Sta 4	Site P, Sta 4	EE-8	381	0-109-10	Dry Line
Site P					
....	Site E	Spare	382	0-109A-9	
....	Site E	Spare	383	0-109A-10	
Site B					
Trk 27	Site E Buoy	Phone	384	2-110-6	Off Parry Ex
Site B	Site L	Phone	385	2-114-1	
Site B	Site L	Spare	386	2-114-2 to 6	
Site B	Site L	Phone	387	2-115-1 to 6	
Site C					
Trk 6	Buoy	Phone	388	3-116-6	Off Runit Ex
Site C	Site M, Sta M-7	Telemetering and Control	389	3-117-1 to 6	EG&G
Site C	Site M, Sta M-60		390	3-118-1 to 6	EG&G
Site D					
Trk 7	Buoy	Phone	391	4-119-6	Off Biijiri Exchange
Bldg 69	Site N, Sta 28	Telemetering and Control	392	4-120-1 to 6	EG&G

[redacted]

WIRE CIRCUIT ASSIGNMENT CHART (*Continued*)

FROM	TO	PURPOSE	CKT NO.	ASSIGNED CHANNEL	REMARKS
Bldg 69	Site R, Sta 23	Telemetering and Control	393	4–121A–1 to 6	EG&G
Site R	Site N	Telemetering and Control	394	4–121B–1 to 6	EG&G
Site E					
Trk 10	Buoy	Phone	395	5–124–6	Off Engebi Exchange
Bldg 69	Site S	Telemetering and Control	396	5–125–1, 2, 3, 4, 6	EG&G
Sta 40	Site S	EE–8	397	5–125–5	Dry Line
Sta 23	Site S, Sta 23A	EE–8	398	5–126–1	Dry Line
Sta 24	Site S, Sta 24A	EE–8	399	5–126–4	Dry Line
Sta 48	Site S, Sta 42.12	EE–8	400	5–126–6	Dry Line
Bldg 69	Site S	Telemetering and Control	401	5–126–2, 3, 5	EG&G
Bldg 69	Site Q	Telemetering and Control	402	5–127–1 to 5	EG&G
Sta 36	Site Q, Sta 60	EE–8	403	5–127–6	Dry Line
Sta 19	Site Q, Sta 4215 and 4216	EE–8	404	5–128–1	Dry Line
Sta 20	Site Q, Sta 64 and 827	EE–8	405	5–182–2	Dry Line
Bldg 69	Site Q	Telemetering and Control	406	5–128–3 to 6	EG&G

Appendix VI

CALL SIGNS, ADDRESS GROUPS, AND ROUTING INDICATORS

1. This Appendix is effective on 25 February 1951 and outlines the call signs, address groups, and routing indicators to be used by elements of Joint Task Force THREE during Operation GREENHOUSE.

(a) The following have been provided:

(1) Task Group organization call signs. JANAP 112 (*).
(2) CW call signs. JANAP 113 (ACP 113) (*), JANAP 115 (*).
(3) Address Groups. JANAP 116 (*).
(4) Routing Indicators. JANAP 117 (*).
(5) Voice call signs. JANAP 119 (*). List "B", Sec 8, is assigned for use by Joint Task Force THREE.
(6) Special call signs. Voice call signs, for units not having call signs provided for in JANAP 119 have been given call signs by Hq, JTF-3, and appear in paragraph three of this appendix.
(7) Visual call signs will be employed as outlined in JANAP 118*.

2. The following CW call signs, voice call signs, address groups, and routing indicators have been extracted from appropriate JANAP's and are listed for convenience.

(a) TASK ORGANIZATION CW AND VOICE CALL SIGNS.

(1) Task Groups and Commanders thereof:

*Indicates current edition of publication.

ACTIVITY	CW TASK ORG. CALL SIGN	VOICE CALL SIGN
CJTF-3	U819	LABORITE
JTF-3	C8QØ	TAVERN
CTG-3.1	Z4E5	BANKSMAN
TG-3.1	L902	SHIFT
CTG-3.2	Z5Q6	STONEHOUSE
TG-3.2	T4UØ	KENCLIVE
CTG-3.3	I 7R2	ADELPHI
TG-3.3	X4P6	REAPER
CTG-3.4	Y8M8	DECERN
TG-3.4	R3GØ	PORKY

(2) Task Units and Commanders thereof:

ACTIVITY	CW TASK ORG. CALL SIGN	VOICE CALL SIGN
	TASK GROUP 3.1	
CTU 3.1.1	Z4E5 B7A5	BANKSMAN ONE
TU 3.1.1	L902 Q70Ø	SHIFT ONE
CTU 3.1.2	Z4E5 X5K1	BANKSMAN TWO
TU 3.1.2	L902 Z9D9	SHIFT TWO
CTU 3.1.3	Z4E5 J3Y5	BANKSMAN THREE
TU 3.1.3	L902 Y2J1	SHIFT THREE
CTU 3.1.4	Z4E5 C3UØ	BANKSMAN FOUR
TU 3.1.4	L902 AØ01	SHIFT FOUR
CTU 3.1.5	Z4E5 ZØB6	BANKSMAN FIVE
TU 3.1.5	L902 G1RØ	SHIFT FIVE
CTU 3.1.6	Z4E5 D4X4	BANKSMAN SIX
TU 3.1.6	L902 J1J5	SHIFT SIX
CTU 3.1.7	Z4E5 V3X9	BANKSMAN SEVEN
TU 3.1.7	L902 05T9	SHIFT SEVEN
	TASK GROUP 3.3	
CTU 3.3.1	I7R2 B7A5	ADELPHI ONE
TU 3.3.1	X4P6 Q70Ø	REAPER ONE
CTU 3.3.2	I7R2 X5K1	ADELPHI TWO
TU 3.3.2	X4P6 Z9D9	REAPER TWO
CTU 3.3.3	I7R2 J3Y5	ADELPHI THREE
TU 3.3.3	X4P6 Y2J1	REAPER THREE
CTU 3.3.4	I7R2 C3UØ	ADELPHI FOUR
TU 3.3.4	X4P6 AØ01	REAPER FOUR
CTU 3.3.5	I7R2 ZØB6	ADELPHI FIVE
TU 3.3.5	X4P6 G1RØ	REAPER FIVE
CTU 3.3.6	I7R2 D4X4	ADELPHI SIX
TU 3.3.6	X4P6 J1J5	REAPER SIX
CTU 3.3.7	I7R2 V3X9	ADELPHI SEVEN
TU 3.3.7	X4P6 05T9	REAPER SEVEN
	TASK GROUP 3.4	
CTU 3.4.1	Y8M8 B7A5	DECERN ONE
TU 3.4.1	R3GØ Q70Ø	PORKY ONE
CTU 3.4.2	Y8M8 X5K1	DECERN TWO
TU 3.4.2	R3CØ Z9D9	PORKY TWO
CTU 3.4.3	Y8M8 J3Y5	DECERN THREE
TU 3.4.3	R3GØ Y2J1	PORKY THREE
CTU 3.4.4	Y8M8 C3UØ	DECERN FOUR
TU 3.4.4	R3GØ AØ01	PORKY FOUR
CTU 3.4.5	Y8M8 ZØB6	DECERN FIVE
TU 3.4.5	R3GØ G1RØ	PORKY FIVE
CTU 3.4.6	Y8M8 D4X4	DECERN SIX
TU 3.4.6	R3GØ J1J5	PORKY SIX
CTU 3.4.7	Y8M8 V3X9	DECERN SEVEN
TU 3.4.7	R3GØ 05T9	PORKY SEVEN
CTU 3.4.8	Y8M8 K3L1	DECERN EIGHT
TU 3.4.8	R3GØ R6A3	PORKY EIGHT

(b) RADIO STATIONS

STATION	CW Call Signs ARMY	CW Call Signs AIR FORCE	CW Call Signs NAVY	Routing Indicators ARMY	Routing Indicators AIR FORCE	Routing Indicators NAVY
BIKATI		AJX–21				
BIKINI		AJX–25				
ENIWETOK ATOLL	ABE 55	AGD–20		UHPJ	JHKQR	
GUAM	ADE	AIH	NPN	UMGC	JMPC	BMPC
HONOLULU	ABA	AGA	NPM	UHPB	JHP	BHPB
JOHNSTON		AGB			JHPN	
KUSAIE		AJX–23				
KWAJALEIN		AGC	NDJ		JHKC	BHPV
LOS ALAMOS	AAE 55			UWFJA		
MAJURO		AJX–22	NDO			
NAURU		AJX–24				
PONAPE			NVW			

(c) ADDRESS GROUPS

The presently assigned address groups for CJTF–3 and subordinate commands will be cancelled on 25 February 1951. After that date use Task Organization call signs from para (2a) above, except the following:

	Address Group	R/I
Admin Hq, Joint Task Force 3, Washn DC	SPES	UEPIT

(d) ROUTING INDICATORS

The following routing indicators are assigned to tributary stations of the Joint Task Force comm center. These indicators are for local use only, and not to reflect outside the theatre.

Comm Center	Routing Indicator
TG 3.1, Parry	RHPJC
TG 3.2, Eniwetok	RHPJA
TG 3.3, USS Curtiss	RHPJN
TG 3.4, Eniwetok	RHPJE

(e) ISLANDS

Island	Voice Call Sign
ANIYAANII	BITTER ROOT
AOMON	BARBOOK
BIIJIRI	FAIRDALE
BOGALLUA	SHRIMPER
EBIRIRU	CAFE SOCIETY
ENGEBI	SHADE TREE
ENIWETOK	MONTEZUMA
JAPTAN	KNIFE POINT
KWAJALEIN	OTHERWISE
PARRY	RUSSIA
ROJOA	BROWN BREAD
RUNIT	SEERSUCKER

3. SPECIAL ASSIGNMENTS

Voice call signs allocated herein may be used to generate additional voice call-signs for local nets, boats, command posts, etc., by suffixing able to zebra or by the addition of numbers.

EXAMPLE: (1) RadSafe Party #1
NCS ....PESO
Member Station #1..........PESO ABLE
Member Station #2..........PESO BAKER etc.
(2) Boats
LCM No. 7 WATERSHED SEVEN
LCPL No. 11 GIRLSCOUT ELEVEN

(a) Voice call signs reserved for temporary assignments of meanings by CTG 3.1.

Voice Time Broadcast .... DEADEYE

WORKING PARTIES

PESO	POT BOILER
RECKON	RIN TIN TIN
YORKTOWN	YARN SPINNER
FLORIDA	FAIR LADY
GIRDLE	GRAND LAMA
ELAPSE	EGG CRATE

CP'S AND MOBILE LAND UNITS:

BEER FOAM
ADJOIN
INTELLECT
STUB TOE

BOATS:

SHIPLOAD
WATERSHED
GIRL SCOUT
AIM WELL

(b) 1. Voice call signs assigned to activities of TG 3.2:

STATION	CALL SIGN
511th Port Co. CP	BLUE LEADER
511th Port Co. Channels	BLUE (No.)
7128 AU CP	RED LEADER
7128 AU CHANNELS	RED (No.)
Military Police	BLACKBAND
	SEQUIN
NCS, HARBOR CONTROL FREQ, (2716 kcs)	ROADRUNNER

2. Voice call signs reserved for temporary assignment of meanings by CTG 3.2:

RUSSIA
TEA KETTLE
GERALDINE
ECCENTRIC
ANTAGONIZE
PLASTERED

(c) 1. Call signs assigned activities TG 3.3.

STATION	CW	VOICE
U.S.S. CURTISS (AV-4)	NEFZ	FIREWORKS ABLE
U.S.S. WALKER (DDE-517)	NWBZ	HEAD BAND
U.S.S. SPROSTON (DDE-577)	NAVU	BRASS PLATE
U.S.S. CABILDO (LSD 16)	NZQL	WARDROBE TARE
U.S.S. LST 859	NINY	BELTING 859
U.S.S. ARD 28	NHZM	SPLICE 28
TG 3.3 BOAT POOL		
LCM (No.)		HEARTLESS (No.)
LCPL (No.)		WATER BUG (No.)
ML (No.)		GRAVEL GERTIE (No.)
AVR (No.)		SAPHIRE (No.)
DUKW (No.)		LANDLUBBER (No.)
LSU ( )		MESH (No.)
SONOBUOY OPERATOR		SPITKIT

2. Voice call signs reserved for temporary assignment of meanings by CTG 3.3.

MIMICAL
SHIP YARD
PILLOWCASE

[redacted]

ALAMEDA
FLOATING RIB
HAWAII

(d) 1. Voice call signs assigned activities TG 3.4.

GROUND STATION AND COMMANDERS	CALL
Drone Unit Commander	PHANTOM
Drone Unit Command post	OBSERVER
Drone Unit Rudder Station	RUMOR
Drone Unit Elevator Station	ECHO
Drone Unit Arrestor Station	DRAGLINK
Drone Unit Control Tower	TOWHEAD
Drone Unit Operation Section	FLYBOY
Drone Unit Communications Section	COMPACT
Drone Unit Electronics Section	REMINDER
All T-33 and B-17 Drones	ALL YELLOW
All T-33 and B-17 Directors	ALL DRIVERS
All T-33 and B-17 Master Directors	ALL OVERDRIVERS
All MSQ-1 Radars	ALL PLOTTERS
Telemetering Station	REGISTER
Experimental Aircraft Unit Call signs*	
Director Aircraft	DRIVE (letter)
Master Director	OVERDRIVE (letter)
Drone	YELLOW (ltr or No.)

* For list of individual call signs see appendix 3 to Annex "D", ATG 3.4 Field Order No. 1.

2. Voice call signs reserved for temporary assignment of meanings by CTG 3.4.

OPPOSITE	ABAFT
INSTRUMENT	BROWN BREAD
AFTERNOON	EAVESDROPPER
STUDIO	GOLDEN FLEECE
ENJOYMENT	HEAVY EYES
BARBARIC	ALMA MATER

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Appendix VII

1 February 1951

FREQUENCY PLAN

Task Group 3.1

CKT J–1 WORKING PARTY NET (Program 1.5.1) (A–3) ENIWETOK
(a) 46.9 mcs

CKT J–2 HQ TU 3.1.1 to SHOT ISLAND TRUCK (A–3) ENIWETOK
(a) 45 kcs

CKT J–3 WORKING PARTY NET (E.G.G.) (A–3) ENIWETOK
(a) 47 mcs

CKT J–4 BROADCAST TIME AND WARNING SIGNALS (Voice or Tone) ENIWETOK
(a) 2315 kcs
(b) 2586 kcs

CKT J–5 WORKING PARTY NET (Program 1.6) (Voice)
(a) 47.05 mcs
(b) 47.1 mcs

CKT J-6 EXPERIMENTAL TG 3.1 TELEMETERING
(a) 200 mcs
(b) 203 mcs
(c) 206 mcs
(d) 209 mcs
(e) 212 mcs
(f) 215 mcs
(g) 218 mcs
(h) 221 mcs
(i) 224 mcs
(j) 227 mcs
(k) 230 mcs

CKT J–7 BIO-MED COMMAND BOAT (NCS) HQ TU 3.1.2
Site "1"—Work Group—General Command Site "B"
(a) 27 mcs—Command Boat to work group
(b) 26.1 mcs—Command Boat to General Command Site "B"
(c) 27.1 mcs—Command Boat to Hq, Site "L"
(d) 26.2 mcs—Hq, Site "L" to Command Boat and Work Group
(e) 27.2 mcs—Work Group to Command Boat and Site "L"

CKT J–8 PROJECT 5.2 (TU 3.1.3)
(a) 160 mcs
(b) 163 mcs
(c) 166 mcs
(d) 169 mcs
(e) 172 mcs

CKT J–9 PLANE TO PLANE (P2V–B17)
(a) 137.7 mcs

CKT J–10 TU 3.1.4
(a) 26.4 mcs—CURTISS, LCT's, LCPL's, and Weapons Carrier (Channel F)
(b) CURTISS—Gen Comd Site "B" (AN/TRC) (Channels A, B, C, and D)
(c) 26.5 mcs—CURTISS to Command Post on PARRY (Channel E)
(d) 190.0 mcs—TU 3.1.4

NOTE: For Voice Channels using AN/TRC, see CKT J–44

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CKT J–11 TU 3.1.5 RAD-SAFE HQ (NCS)
- (a) 47.15 mcs—Survey Parties
- (b) 47.2 mcs—Survey Parties
- (c) 137.88 mcs—RadSafe Hq, Gen Hq, Mother Planes, etc.
- (d) 27.4 mcs—Water Track to RadSafe Hq, Gen Comd, Shot Island
- (e) 27.6 mcs—Islands RadSafe D plus 1 to D plus 5

CKT J–12 HOLMES AND NARVER
- (a) 47.25 mcs—Working Party Net
- (b) 26.6 mcs—Boat Pool Net
- (c) 27.3 mcs—Boat Pool Net
- (d) AN/TRC Backup— (See CKT J–46)
- (e) 27.9 mcs—Boat Pool Net

CKT J–13 AIR GROUND 3.1.4 A–3
- (a) 150.06 mcs
- (b) 136.88 mcs

CKT J–14 TANK TEST NET TU 3.1. (Program 8)
- (a) 21.1 mcs

CKT J–15 TU 3.1.3 (Program 6)
- (a) 21.3 mcs

CKT J–16 TU 3.1.1 (Program 6)
- (a) 47.4 mcs
- (b) 26.1 mcs

CKT J–17 through 30, UNASSIGNED

Task Group 3.2

CKT J–31 SHIP-SHORE (CW) (SIMPLEX)
- (a) 2844 kcs

CKT J–32 SHIP-SHORE (VOICE) (SIMPLEX)
- (a) 2716 kcs

CKT J–33 LIGHTERAGE NET (VOICE) (SIMPLEX)
- (a) 4240 kcs

CKT J–34 ADMINISTRATIVE NET (CW) (SIMPLEX) (Navy P–33) KWAJALEIN (NCS)—MAJURO—ENIWETOK—WAKE—CTG 3.3
- (a) 6440 kcs

CKT J–35 ENIWETOK-LOS ALAMOS (RATT) (DUPLEX) ADMINISTRATIVE

Eniwetok Transmits	Los Alamos Transmits
(a) 7720 kcs	(d) 7310 kcs
(b) 12400 kcs	(e) 12010 kcs
(c) 18737.5 kcs	(f) 18500 kcs

CKT J–36 ENIWETOK-OAHU (RATT) (DUPLEX) ADMINISTRATIVE

(a) 9920 kcs	(e) 8735 kcs
(b) 11275 kcs	(f) 12922.5 kcs
(c) 17870 kcs	(g) 17210 kcs
(d) 19695 kcs	

CKT J–37 ENIWETOK-KWAJALEIN (CW) (SIMPLEX)
- (a) 8860 kcs

CKT J–38 ENIWETOK-HONOLULU (CW) (SIMPLEX)
- (a) 8860 kcs

CKT J-39 ALERT DEFENSE NET (VOICE) (SIMPLEX)
(a) 42.4 mcs (c) 41.4 mcs
(b) 42.8 mcs (d) 41.2 mcs

CKT J-40 MP—MOBILE AND FIXED (VOICE)
(a) 30.1 mcs

CKT J-41 P.O.L. OFFICER (TANK FARM TO SHIP) (VOICE) (SIMPLEX)
(a) 47.8 mcs

CKT J-42 511th PORT CO. HARBOR CONTROL NET (VOICE) (SIMPLEX)
(a) 47.9 mcs

CKT J-43 UNASSIGNED

CKT J-44 RADIO LINK—LANDLINE BACKUP (AN/TRC)
(a) 72.2 mcs—ENIWETOK to PARRY
(b) 95.4 mcs—PARRY to ENIWETOK

CKT J-45 RADIO LINK—LANDLINE BACKUP (AN/TRC)
(a) 80.0 mcs—AV-4 to Parry (b) 98.8 mcs—PARRY to AV-4

CKT J-46 RADIO LINK—LANDLINE BACKUP (AN/TRC)
(a) 78 mcs—SHOT ISLAND to ENIWETOK
(b) 83 mcs—ENIWETOK to SHOT ISLAND

CKT J-47 AFRS ENIWETOK-ARMED FORCES BROADCAST STATION
(a) 1360 kcs

CKT J-48 WARNING CKT (ARPACAS) (CW)
(a) 8330 kcs (b) 15160 kcs

CKT J-49 MP SECURITY CONTROL
(a) 24.4 mcs (b) 24.5 mcs

Task Group 3.3

CKT J-50 ADMINISTRATIVE CTG 3.3 TO GUAM (RATT) (DUPLEX) (JANAP 195) (A) (CKT P14)

Guam	CTG 3.3
(a) 4692.5 kcs	(d) 5260 kcs
(b) 7645 kcs	(e) 7365 kcs
(c) 13327.5 kcs	(f) 12960 kcs

CKT J-51 SONOBUOY CONTROL CIRCUIT—ENIWETOK (VOICE) (SIMPLEX) (JANAP 195 (A) CKT C3.3C)
(a) 2656 kcs

CKT J-52 SURFACE PATROL—CTG 3.3 to TU 3.3.2 (CW) (SIMPLEX) (JANAP 195 (A) CKT C4)
(a) 2534 kcs (Primary) (c) 73.3 mcs (Common)
(b) 532 kcs (Secondary)

CKT J-53 AIR PATROL—CTG 3.3 to TU 3.3.3 (CW) (SIMPLEX) (JANAP 195 (A) CKT E11)
(a) 3415 kcs (c) 7305 kcs
(b) 5505 kcs (d) 11390 kcs

CKT J-54 ANTI-SUB, WARFARE NET, AIR AND SURFACE (VOICE) (SIMPLEX) (JANAP 195 (A) CKT C6)
(a) 3345 kcs (Primary) (b) 142.74 mcs (Secondary)

CKT J-55 DRILL CKT—TG 3.3 (TRAINING) (CW/VOICE) (SIMPLEX) (JANAP 195 (A) CKT C3.3E)
(a) 2122 kcs

CKT J-56 BOAT POOL TG 3.3 (VOICE) (SIMPLEX) (JANAP 195 (A) (CKT D57A)
(a) 25.5 mcs
(b) 25.6 mcs
(c) 25.7 mcs

CKT J-57 SONOBUOY OPERATING FREQUENCIES (TONE)
Sonobuoys to Sonobuoy Receiver Operator
(a) 70.7 mcs
(b) 71.8 mcs
(c) 74 mcs
(d) 76 mcs
(e) 77.5 mcs
(f) 81.2 mcs
(g) 84.5 mcs
(h) 85.5 mcs
(i) 86 mcs
(j) 89 mcs

CKT J-58 AIRCRAFT TO AIRCRAFT COMMON (VOICE) (SIMPLEX)
(a) 142.74 mcs

CKT J-59 GENERAL WARNING—SURFACE (VOICE)
(a) 3000 kcs

CKT J-60 VOICE TIME RE-BROADCAST SIMULTANEOUSLY FROM CKT J-4
(a) 142.74 mcs (Primary)
(b) 3345 kcs (Secondary)

Task Group 3.4

CKT J-61 ENIWETOK-KWAJALEIN (DUPLEX) (RATT)
Eniwetok Transmits
(a) 5742.5 kcs
(b) 9062.5 kcs
(c) 3242.5 kcs
Kwajalein Transmits
(d) 6050 kcs
(e) 9020 kcs
(f) 3340 kcs

CKT J-62 GUAM WEATHER INTERCEPT (RATT) (AF CKT 73RBW1)
(a) 4030 kcs
(b) 8105 kcs
(c) 13007.5 kcs
(d) 17040 kcs
(e) 21810 kcs

CKT J-63 UNASSIGNED

CKT J-64 UNASSIGNED

CKT J-65 UNASSIGNED

CKT J-66 ZI-HONOLULU-ENIWETOK FACSIMILE INTERCEPT (A-4)
(a) 8855 kcs
(b) 13477.5 kcs
(c) 16930 kcs

CKT J-67 SAFETY AND CONTROL NET (CW) (SIMPLEX) GUAM (NCS) HICKAM-JOHNSTON-KWAJALEIN (AF CKT 7M 901)
(a) 9220 kcs
(b) 11407.5 kcs
(c) 15805 kcs

CKT J-68 ENIWETOK (NCS) - MAJURO - BIKATI - KUSAIE - NAURU - KWAJALEIN WEATHER NET (CW) (VOICE EXTENSION BIKINI) (SIMPLEX)
(a) 5695 kcs
(b) 8785 kcs
(c) 9177.5 kcs
(d) 12070 kcs

CKT J–69 ENIWETOK-KWAJALEIN (VOICE) (DUPLEX)

Eniwetok Transmits
(a) 6895 kcs
(b) 9680 kcs
(c) 12037.5 kcs

Kwajalein Transmits
(d) 6200 kcs
(e) 9545 kcs
(f) 12610 kcs

CKT J–70 AIR ROUTE KWAJALEIN CONTROL (STANDARD PACIFIC FACILITY CHART) (CW) (SIMPLEX)

(a) 3450 kcs
(b) 6430 kcs
(c) 7870 kcs
(d) 10355 kcs
(e) 13075 kcs

CKT J–71 WEATHER RECONNAISSANCE—ENIWETOK-KWAJALEIN RECON AIRCRAFT (CW) (SIMPLEX) COMMON

(a) 4330 kcs
(b) 7685 kcs
(c) 14450 kcs

CKT J–72A AIR DISTRESS (CW) (VOICE) ENIWETOK

(a) 500 kcs—Guard Only
(b) 8280 kcs—Transmit and Receive

CKT J–72B AIR DISTRESS (CW) (VOICE) KWAJALEIN

(a) 500 kcs—Guard Only
(b) 8280 kcs—Transmit and Receive

CKT J–73A AIRPORT TRAFFIC CONTROL TOWER—ENIWETOK (STANDARD PACIFIC FACILITY CHARTS) (VOICE)

Base Transmits
(a) 272 kcs

Base Receives Only
(b) 4765 kcs
(c) 4495 kcs

Base Transmits and Receives
(d) 121.50 mcs
(e) 126.18 mcs
(f) 137.88 mcs
(g) 140.58 mcs

CKT J–73B AIRPORT TRAFFIC CONTROL TOWER—KWAJALEIN (STANDARD PACIFIC FACILITY CHARTS) (VOICE)

Base Transmits
(a) 278 kcs

Base Receives Only
(b) 4765 kcs
(c) 4495 kcs

Base Transmits and Receives
(d) 121.50 mcs
(e) 126.18 mcs
(f) 137.88 mcs
(g) 140.58 mcs

CKT J–74A APPROACH CONTROL—ENIWETOK (VOICE)

(a) 272 kcs—Base Transmits Only
(b) 6500 kcs—Base Receives Only
(c) 6970 kcs—Base Receives Only

Base Transmits and Receives
(d) 121.50 mcs
(e) 126.18 mcs
(f) 137.88 mcs
(g) 140.58 mcs

CKT J–74B APPROACH CONTROL—KWAJALEIN (VOICE)

(a) 326 kcs—Base Transmits only (SRAZ Range)

Base Transmits and Receives
(b) 6500 kcs
(c) 121.50 mcs
(d) 126.18 mcs
(e) 137.88 mcs
(f) 140.58 mcs
(g) 4495 kcs—Base Receives Only
(h) 4764 kcs—Base Receives Only

CKT J–75A LOW FREQUENCY HOMING BEACON—ENIWETOK (A–2)

(a) 345 kcs—Base Transmits and Monitors

CKT J–75B LOW FREQUENCY HOMING BEACON—KWAJALEIN (A–2)

(a) 359 kcs—Base Transmits and Monitors

CKT J–76A VHF DIRECTION FINDING—ENIWETOK (A–3)

(a) 121.50 mcs
(b) 126.18 mcs
(c) 137.88 mcs
(d) 140.58 mcs

CKT J–76B VHF DIRECTION FINDING—KWAJALEIN (A–3)

(a) 121.50 mcs
(b) 126.18 mcs
(c) 137.88 mcs
(d) 140.58 mcs

CKT–J–77 FM RADIO LINK (LANDLINE BACKUP)—ENIWETOK

A AACS OPERATIONS TO AACS TRANSMITTERS (DUPLEX)

(a) 71.2 mcs
(b) 73.2 mcs

B AACS OPERATION TO AACS TRANSMITTERS (SIMPLEX)

(a) 92 mcs

C AACS OPERATIONS TO AACS CONTROL TOWER (DUPLEX)

(a) 93 mcs

D AACS OPERATIONS TO AACS (INTERCOMM: Control Tower; VHF D/F; Base Ops; Air-Sea Rescue)

(a) 94.8 mcs

CKT J–78 KWAJALEIN-HICKAM (RATT) DUPLEX (AF CKT 7R613 AND 7R614)

Kwajalein Transmits	Hickam Transmits
(a) 9935 kcs	(d) 9070 kcs
(b) 15575 kcs	(e) 13442.5 kcs
(c) 17720 kcs	(f) 17852.5 kcs

CKT J–79 KWAJALEIN-GUAM (RATT) (DUPLEX) (AF CKT 7R915 AND 7R916)

Kwajalein Transmits	Guam Transmits
(a) 8750 kcs	(d) 8935 kcs
(b) 12285 kcs	(e) 12940 kcs
(c) 17280 kcs	(f) 17470 kcs

CKT J–80 KWAJALEIN-WAKE (CW) (SIMPLEX)

Use CKT J–34 (JANAP 195 (A) CKT P33)

CKT J–81 AIR ROUTE KWAJALEIN-JOHNSTON AIRWAYS (CW) (SIMPLEX)

(a) 3450 kcs
(b) 6430 kcs
(c) 7870 kcs
(d) 10355 kcs
(e) 13075 kcs

CKT J–82 AIR ROUTE KWAJALEIN-GUAM AIRWAYS (CW) (SIMPLEX)

(a) 3450 kcs
(b) 7870 kcs
(c) 10355 kcs
(d) 13075 kcs

CKT J–83A RADIO CONTROL DRONE AIRCRAFT OPERATION (FM) (ATU 3.4.2)

	Channel		Channel
(a) 31.3 mcs	A.	(i) 39.8 mcs	I.
(b) 32.3 mcs	B.	(j) 40.8 mcs	J.
(c) 33.3 mcs	C.	(k) 41.8 mcs	K.
(d) 34.3 mcs	D.	(l) 42.8 mcs	L.
(e) 35.3 mcs	E.	(m) 43.8 mcs	M.
(f) 36.8 mcs	F.	(n) 44.8 mcs	N.
(g) 37.8 mcs	G.	(o) 45.8 mcs	O.
(h) 38.8 mcs	H.		

CKT J–83B RADIO CONTROL (RUDDER AND ELEVATOR STATIONS FOR DRONE B–17 TAKE-OFF AND LANDING):
(a) 142.2 mcs (Primary Frequency)
(b) 149.22 mcs (Secondary Frequency)

CKT J–84 RADIO LINK FOR RADAR CONTROL (TONE)
(a) 65.94 mcs (b) 86.55 mcs (c) 83.94 mcs (d) 91.431 mcs

CKT J–85 TELEMETERING—TELEVISION (DRONE CONTROL)
(a) 254–372 mcs

CKT J–86 RADAR SEARCH—ENIWETOK
(a) 9345 mcs

CKT J–87 RADAR SEARCH—ENIWETOK
(a) 9405 mcs

CKT J–88 RADAR BEACON—ENIWETOK
(a) 9315 mcs

CKT J–89A RADAR CONTROL POSITIONING—ENIWETOK
(a) 2700–2900 mcs

CKT J–89B RADAR CONTROL POSITIONING—ENIWETOK
(a) 2700–2900 mcs

CKT J–89C RADAR CONTROL
(a) 139.86 mcs (Site #1 Plotter)
(b) 133.56 mcs (Site #2 Plotter)
(c) 134.82 mcs (Site #3 Plotter)
(d) 135.54 mcs (Site #4 Plotter)

CKT J–90 TELEMETERING FOR RADAR CONTROL
(a) 2200–2350 mcs

CKT J–91 NAF HOMING—ENIWETOK
(a) 135.54 mcs (b) 135.72 mcs

CKT J–92 TIMING AND TELEMETERING—ENIWETOK
(a) 151.02 mcs—Timing (b) 136.26 mcs—Telemetering

CKT J–93 RADIO CONTROL—ENIWETOK
(a) 142.20 mcs (b) 149.22 mcs

CKT J–94 DRONE UNIT COMMON—ENIWETOK
(a) 143.10 mcs (b) 5780 kcs

CKT J–95 ARRESTOR STATION—ENIWETOK
(a) 149.58 mcs

[redacted]

CKT J-96 VHF GUARD—ENIWETOK

(a) 134.1 mcs
(b) 140.4 mcs

CKT J-97 EXPERIMENTAL AIRCRAFT, ENIWETOK, TU 3.4.2

(a) 120.00 mcs
(b) 121.50 mcs
(c) 124.00 mcs
(d) 126.18 mcs
(e) 130.00 mcs
(f) 132.12 mcs
(g) 133.56 mcs
(h) 134.32 mcs
(i) 135.54 mcs
(j) 135.72 mcs
(k) 138.42 mcs
(l) 138.60 mcs
(m) 139.00 mcs
(n) 141.66 mcs
(o) 142.10 mcs
(p) 142.20 mcs
(q) 143.10 mcs
(r) 144.00 mcs
(s) 148.00 mcs
(t) 148.50 mcs
(u) 149.22 mcs
(v) 149.58 mcs
(w) 151.02 mcs

CKT J-98A DRONE UNIT TG 3.4

(a) 5062.5 kcs
(b) 7837.5 kcs
(c) 11230.0 kcs

CKT J-98B DRONE UNIT EMERGENCY

(a) 138.42 mcs

CKT J-98C TASK GROUP GUARD (time signals)

(a) 143.10 mcs

CKT J-99 TG 3.4

(a) 3375 kcs
(b) 4928 kcs
(c) 8105 kcs
(d) 12975 kcs

CKT* J-100 SEARCH AND RESCUE (SAR) TG 3.3

Control (CW)
(a) 3310 kcs
(b) 7945 kcs
(c) 12745 kcs

Coord Voice
(d) 121.5 mcs
(e) 4475 kcs

CKT J-101A VOICE TIME RE-BROADCAST SIMULTANEOUSLY FROM CKT J-4

(a) 135.72 mcs
(b) 121.50 mcs
(c) 132.12 mcs
(d) 141.66 mcs
(e) 143.10 mcs

CKT-J-101B TIME REFERENCE (T-5 and T-0 Signal to Start Instrumentation)

(a) 149.58 mcs

CKT-J-102 FIRE AND CRASH TRUCK

(a) 25.2 mcs

CKT-J-103 TASK GROUP COMMON (AIR OPERATIONS CENTER)

(a) 135.72 mcs

CKT-J-104 TASK UNIT COMMON (DRONE UNIT COMMAND)

(a) 132.12 mcs

CKT-J-105 GROUND CONTROLLED INTERCEPT (FIGHTER FLIGHT)

(a) 141.66 mcs

CKT-J-106	HOMING (AN/ARA-8, T-33)	
	(a) 136.26 mcs (Primary)	(b) 136.08 mcs (Secondary)
CKT-J-107	FIGHTER COMMON	
	(a) 136.80 mcs (Primary)	(b) 134.10 mcs (Secondary)

Above constitutes the VHF frequencies which have been used in TG 3.4 operations exclusive of normal control tower frequencies.

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Appendix VIII

HEADQUARTERS

JOINT TASK FORCE THREE

APO 187

AG 371.2 1 May 1951

SUBJECT: Classification Criteria

TO: See Distribution

1. This letter supersedes letter this headquarters dated 31 March 1950, subject and file number same as above which will be removed from staff division files and destroyed in accordance with AR 380–5.

2. The following classification criteria is announced:

SUBJECT MATTER	CLASSIFICATION
a. Existence of Joint Task Force THREE	Unclassified
(1) Names of Commander, Deputies, and key staff	Unclassified
b. Existence of Army, Navy, Air Force and Scientific Task Groups	Unclassified
c. Names of Commanders thereof	Unclassified
d. Orders from Armed Services directing personnel to report to Joint Task Force THREE for duty	Unclassified
e. Code word "GREENHOUSE" and its meaning (Conduct of nuclear detonation test program at Eniwetok Atoll by JTF–3)	Unclassified
f. General statements that plans and preparations have been made for GREENHOUSE program test at Eniwetok not indicating exact time or extent	Unclassified
(1) Proposed exact time of the test:	
(a) nearest minute until lower classification is applied	Secret
(b) Day of test until lower classification is applied	Confidential
(2) General statements that test will be held in 1951	Unclassified
(3) Information indicating strength, exact mission, or composition of subordinate Task Groups or detailed composition of JTF–3	Confidential or higher
g. Information as to number of shots to be conducted	Confidential
h. Layout of base facilities; e.g., power houses and system, telephone exchanges and system, water plant and distribution, mess halls, commissaries, motor pools, POL facilities, repair shops, etc.	Restricted
i. Tower	
(1) Shot Tower	Confidential
(2) Photo Tower, if purpose is or is not indicated	Restricted
j. Detailed layouts of individual islands or the Atoll which indicate the scope of the scientific program; e.g., "as completed" drawings	Secret
k. Fact that animal exposures (except mice) are contemplated in biomedical program	Confidential

[redacted]

[redacted]

SUBJECT MATTER	CLASSIFICATION
l. The existence of an experimental program for the study of blast effects on structures and structural members	Restricted (minimum)
m. Relationship of H&N to TG 3.1 and JTF–3	Unclassified
n. Extent of construction work beyond maintenance and rehabilitation of facilities	Confidential
o. Names of shot islands when connected with shot operations (Islands in themselves Unclassified)	Confidential
p. Number of experimental aircraft present, or movement of such aircraft	Confidential
q. Array or flight pattern of airborne aircraft at detonation time	Confidential
r. Photographs (films and prints), awaiting official classification review (developed and undeveloped)	Secret (Restricted Data)
s. Information concerning security clearance	Restricted
t. Information relating to roll-up or to Post GREENHOUSE garrison forces	Restricted (minimum)
u. Operational data as to deployment of defensive forces	Restricted (minimum)
v. Shot time operational data as to JTF–3 and Task Group operations	Confidential or higher
w. Information concerning the results of any test conducted	Classified on own merits. Minimum classification — Confidential and probably Restricted Data. (Note: All Restricted Data and TS Documents must be officially couriered to ZI.)
x. Movement of Official Observers from which operational dates can be deduced	Confidential

BY COMMAND OF LIEUTENANT GENERAL QUESADA:

EMORY W. COFIELD
Colonel, USAF
Adjutant General

DISTRIBUTION:
"C"

Appendix IX

APPLICABLE JANAP'S

JANAP	EFFECTIVE CHANGES OR SUPPLEMENTS	LONG TITLE	CLASSIFICATION
110	Ch. 1	Joint Tactical Call Sign Book	Conf.
111		Joint Call Sign Book for Communication Reserve	Rest.
112		Joint Task Organization Call Sign Book	Conf.
113	Ch. 1	Joint Call Sign Book for Ships	Rest.
115		Joint Call Sign Book for Aircraft and Airships	Rest.
116	Ch. 1, 2.	Joint Delivery Group Book	Rest.
117	Sups 1, 2 & Chs. 1, 2.	Joint Routing Indication Book	Rest.
118		Joint Visual Call Sign Book	Rest.
119	Ch. 1, 2, 5.	Joint Voice Call Sign Book	Rest.
121	Ch. 11, 12, 13.	Joint Communication Instructions Part I—General	Rest.
122	Ch. 1, 3	Joint Communication Instructions Part II—Security	Rest.
123		Joint Communication Instructions Part III—Gen Proced.	Rest.
124		Joint Comm Instructions Part IV—Radio Tele Proced.	Rest.
125		Joint Comm Instructions Part V—Radio Teleph Proced	Rest.
126		Joint Comm Instructions Part VI—Teletypewrtr Proc.	Rest.
127		Joint Comm Instructions Part VII—Tape Relay Proc.	Rest.
130	Ch. 1, 2.	Joint Comm Instructions Part X—Dir/Find Procedure	Unclass.
131	Ch. 1	Joint Comm Instructions Appdx I—Op Signals	Unclass.
132		Joint Comm Instructions Appdx II—Abbreviations	Rest.
133		Joint Comm Instructions Appdx III—Defin & Termo	Rest.
134		Joint Comm Instructions Appdx IV—Teleph switch Op Proc.	Unclass.
142		Joint Air Warning & Defense Code.	Rest.
145		Merch Ship Comm Facil	Unclass.
146		Comm Inst for Rpt Mil Intelligence Sightings (CIRMIS)	Rest.
150		Joint Recgn & Id Inst—General	Conf.
151		Joint Recgn & Id Inst—Air Force	Conf.
152		Joint Recgn & Id Inst—Grnd Forces	Conf.
153		Joint Recgn & Id Inst—Sur Forces	Conf.
154		Joint Recgn & Id Inst—Harbor Def	Conf.
158		Joint Recgn & Id Inst—Air Force and Ground Force	Conf.
195		Basic Armed Forces Communications Plan (BAFCOM) Navy Communications Frequency Plan	Conf.

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Appendix X

RESTRICTED

ENIWETOK ATOLL

CONSOLIDATED

TELEPHONE DIRECTORY

14 APRIL 1951

SECTION I—HQ JTF–3 CLASSIFIED SECTION—PARRY ISLAND
SECTION II—HQ JTF–3 PERSONNEL SECTION—PARRY ISLAND
SECTION III—HQ TG 3.1 (INCLUDING AEC AND H&N) CLASSIFIED SECTION PARRY AND OTHER ISLANDS
SECTION IV—TG 3.1 (INCLUDING AEC) PERSONNEL SECTION—PARRY ISLAND
SECTION V—TG 3.2 AND TG 3.4 ENIWETOK ISLAND
SECTION VI—TG 3.3 (CABLE BUOYS OFF PARRY, RUNIT, BIIJIRI, AND ENGEBI)

EMERGENCY CALLS—ENIWETOK

FIRE (TELL OPERATOR—"I WANT TO REPORT A FIRE")			117
AMBULANCE (EMERGENCY)			16
GUARD HEADQUARTERS (MILITARY POLICE)			37
INFORMATION (ASK OPERATOR FOR INFORMATION)			
STAFF DUTY OFFICER			7
AIR OFFICER OF THE DAY			7
AIR FORCE BASE OPERATIONS (SEARCH AND RESCUE)			153
FIRE MARSHAL TG 3.2	DAY 59	NIGHT	168
FIRE MARSHAL TG 3.4	DAY OR NIGHT		59
TELEPHONE SERVICE	DAY 31	NIGHT	210
ENGINEER MAINTENANCE BRANCH	DAY OR NIGHT		59

EMERGENCY CALLS:	PARRY	ENGEBI	BIIJIRI	RUNIT
FIRE	100	8 ring 1	31	24
GUARDS (H&N)	35	1 ring 1	24	24
GUARDS (MIL POLICE)	31	13	25	7
HOSPITAL OR DISPENSARY	200	7	34	3
INFORMATION	60	26	27	58
MAINTENANCE (PARRY)	DAY 25		NIGHT	110

RETENTION OF THIS DIRECTORY UPON DETACHMENT FROM THIS STATION IS *PROHIBITED*. DELIVERY OF THIS DIRECTORY TO ANY AGENCY OR PERSON NOT AFFILIATED WITH THIS STATION IS *PROHIBITED*. ALL COPIES MUST BE DESTROYED WHEN NO LONGER REQUIRED. *PLEASE* TAKE CARE OF THIS DIRECTORY. *PLEASE* ASK BY NUMBER *ONLY*.

TELEPHONE SERVICE.

a. Description of System. The telephone system for Eniwetok ATOLL consists of manual common battery switchboards located on Eniwetok, Parry, Engebi, Biijiri, and Runit Islands and aboard the USS Curtiss. Japtan is served from the Parry switchboard; Muzin and Teiteiripuchi Island are served from Engebi and Piiraai and Bokonaarappu Islands are served from the

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switchboard on Biijiri. These switchboards are interconnected by an inter-Island and buoy cable system backed up by radio telephone circuit.

b. Security.

(1) The Eniwetok Atoll telephone system is approved for discussion of matter classified up to and including Secret, when business of this nature cannot be accomplished by personal conference or teletype dispatch. TOP SECRET and AEC "RESTRICTED DATA" will *not* be discussed over the Island Telephone system.

(2) When cable circuits are inoperative or when all cable circuits are in use, the telephone operator may complete the desired connection over a radio telephone back up circuit. In the event that a radio circuit is used, the telephone operator will in such case advise the subscriber "This is a radio circuit, watch your security." Classified information will not be discussed over a radio circuit and in this respect, if one of the conversing parties must for some reason call another person of his office to take over and continue the call, he must advise that person that a radio channel is in use. In addition a high-pitched tone signal occurring approximately every two seconds may be heard as an additional warning that a radio circuit is being used. These circuits may be monitored and if classified information is being discussed, the conversation will be interrupted.

c. Operating Procedures.

(1) To place a local call, refer to the local section of directory then ask operator for the number listed. To place a "trunk" call to another island, ask the local operator for the island by name. When the distant operator answers, ask for the number listed under the other island.

(2) Information Service. Please refer to the telephone directory before placing a call. If the office of individual with whom you wish to speak is not listed, ask the operator for "information".

(3) "Urgent" Calls. Urgent calls are normally reserved for messages of such a nature which may materially affect plans or the course of action and include such items as unidentified sightings, accidents, or fire. In placing a call of this nature the calling party will identify himself to the operator, use the phrase "Urgent" and give the operator the number(s) desired. If the called party is busy or all trunks to the called switchboard are busy the operator may interrupt any call. In such cases, the operator will advise, "I must interrupt, urgent call (name the party or switchboard), please hang up."

DO NOT PICK UP RECEIVER UNTIL READY FOR NUMBER

SECTION I

HEADQUARTERS

JOINT TASK FORCE THREE (FORWARD)

CLASSIFIED

PARRY ISLAND EXCHANGE

		OFFICE PHONE	QTRS PHONE
COMMANDER	LT GEN E. R. QUESADA, USAF	33 & 66	55
Deputy Commander (Scientific)	DR. A. GRAVES, AEC	77	44
Deputy Commander (Opns & Sec)	REAR ADM TOM B. HILL, USN	49	120
Chief of Staff	BRIG GEN JOHN K. GERHART, USAF	48 & 62	120

		OFFICE PHONE	QTRS PHONE
Asst to Comdr (Radiological Matters)	BRIG GEN JAMES P. COONEY, USA	76	120
Inspector General	COL FREDERICK A. BACHER, USAF	75	128
Historian	DR. HENRY L. BOWEN	52	122
Secretariate	MAJOR VITO S. PEDONE, USAF	52	122
Asst Secretariate	MAJOR THEODORE R. DALE, USAF	52	122
	STAFF		
ADJUTANT GENERAL	COL EMORY W. COFIELD, USAF	61	124
Asst Adj Gen	CAPT ROBERT L. BRYANT, JR, USAF	61	108
AG Personnel	LT MATTHEW J. WOJCICKI, USN	167	108
AG Publications	LT FRANCIS L. ZINKAND, USAF	162	108
AG Message Center	LT FRANCIS L. ZINKAND, USAF	162	108
TOP SECRET CONTROL	MAJOR CARL M. McINTYRE, USA	154	128
ASST C/S, J-1	COL THOMAS E. P. BARBOUR, USA	153	126
Deputy AC/S, J-1	COL MAXWELL H. THOMPSON, USA	153	124
Policy and Procurement	CAPT FRANCIS W. LEADEN, USAF	153	108
Chaplain	COL LEXINGTON O. SHEFFIELD, USA	166	126
Surgeon	COL. CHARLES P. WARD, USA	34	124
Special Services	CAPT WILLIAM H. McKINNEY, USAF	166	108
ASST C/S, J-2	LT COL ROLAND M. GLESZER, USA	72	128
Dep Asst, C/S, J-2	CDR JOHN C. MATHEWS, USN	72	128
Administrative Off	LT COL EDWIN H. GARRISON, USAF	74	126
Estimates Section	CDR JOHN C. MATHEWS, USN	59	128
Operational Int. Sec.	CDR WILLIAM R. DELOACHE, USN	74	128
Security Section	MR. W. T. RILEY, AEC	38	128
	LT COL RALPH H. CURRIN, USAF	59	128
	LT COL ROBINSON G. MINICK, USAF	59	128
ASST C/S, J-3	COL PAUL T. PREUSS, USAF	53	122
Dep Asst C/S, J-3	COL ROBERT R. GIDEON, USAF	54	122
Administrative Ex	1ST LT WILLIAM F. SKIDMORE, USA	53	108
Administrative Asst	WOJG PAUL D. WILLIAMS, USA	54	108
Chief, Mil Oper. Br	CDR WILLIAM M. McCORMICK, USN	63	122
Naval Desk	CDR WILLIAM M. McCORMICK, USN	63	122
Army Desk	LT COL ROMAN J. PEISINGER, USA	65	122
Air Force Desk	LT COL LOREN E. IRELAND, USAF	67	122
Special Proj. Desk	CDR LESLIE A. PEW, USN	65	124
Chief, Tech Oper. Br.	COL GEORGE F. TAYLOR, USAF	67	124
Scientific Desk	LT COL P. L. HOOPER, USA	67	122
Military Desk	LT COL JOHN C. DAMON, USA	67	124
Rad-Safe Desk	CDR RUSSELL H. MAYNARD, USN	68	124
Weather Desk	LCDR ELBERT W. PATE, USN	63	124
ASST C/S, J-4	COL WILLIAM E. PHERIS, USA	180	126
Dep Asst C/S, J-4	COL ROBERT F. ALEXANDER, USA	71	124
Administrative Off	LT JOHN W. LUTZELMAN, USN	71	108
Installations	MAJOR BRUCE D. JONES, USA	156	124

		OFFICE PHONE	QTRS PHONE
ASST C/S, J-4 (*Continued*)			
Transportation	MAJOR ROBERT D. DENCHFIELD, USA	157	126
Supply	LT COL ROBERT L. ELY, USA	158	126
ASST C/S, J-5	COL LELAND H. STANFORD, USA	69	128
Dep Asst C/S, J-5	COL WESLEY E. CALKINS, USAF	69	128
Plans & Logistics	MAJOR ERNEST S. KING, USA	69	124

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Appendix XI

COMMUNICATION SECURITY

HEADQUARTERS
JOINT TASK FORCE THREE
Washington 25, D. C.
22 January 1951

1. PURPOSE

a. The mission of Communication Security in Operation GREENHOUSE is to deny the USSR any significant data through communications relative to the tests on Eniwetok Atoll.

b. Capabilities of the USSR in electronic warfare are as follows: First, countermeasures can be used against our electronic circuits. The Soviets are known to have seized, and either employed in the Soviet Zone of Germany or evacuated to Russia, a number of scientists, technicians, and institutions engaged in jamming and anti-jamming of electronic circuits. Forty two (42) different German jammer designs have been available to the Soviet Union since 1945. While some of these are not too efficient, the Soviet Union received through Lend-Lease complete details on several allied jammers including some very efficient American models. Certain of these jammers also have been on the American surplus market. One of these was an airborne jammer capable of jamming to 1400 Megacycles. The success of the jamming of the "Voice of America" broadcast attests to the Soviet Union's efficiency when it desires to achieve a goal. It is believed certain Soviet battleships and heavy cruisers carry radar interference equipment for use on wavelengths up to 50 centimeters. It is logical to assume they have not neglected submarines in electronic warfare countermeasures. Jamming of our circuits during the tests could effectively destroy the control so necessary.

The second and probably the most likely used capability of the Soviets is communication reconnaissance, i.e., interception of electronic circuits. It is known that the Russians are engaged in interception work and are highly competent in that field. Their ability in cryptoanalysis, traffic analysis and procedure analysis is known to be of high caliber. Our long range radio circuits can be intercepted from within the confines of the USSR. Our short range circuits could be intercepted by a clandestine submarine or a long range reconnaissance plane of a transport type or surface ships in vicinity of the Eniwetok Atoll.

c. Good signal security will minimize the danger of the above hazards. Therefore, it is the responsibility of every commander to enforce signal security to the highest possible degree. To minimize the effects of the above two capabilities all units of Operation GREENHOUSE must take the following steps:

(1) *General*

(a) Adhere strictly to the communication security regulations as prescribed in JANAP 122 (A).

(b) Indoctrinate all personnel on necessity of communication security in Operation GREENHOUSE. The Communication Security Section of J-5 Division of Headquarters, JTF-3 will lend assistance to commanders when requested.

(c) Eliminate excessive electrically transmitted messages. Reduce both the number and the length of messages to the bare minimum consistent with operational and administrative requirements. Volume of messages is very helpful to enemy analysts, hence the smaller the number they receive the less they can deduce from volume. Excessive wordage, even though encrypted, may increase the possibility of breaking

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messages by USSR crypto-analysts. Messages having unusual characteristics such as "out-of-the-ordinary" precedence or abnormal length alert enemy analysts and permit them to make deductions. Therefore, commanders should eliminate any messages which are abnormal so as not to alert enemy analysts to any significant happening.

(d) Radio silence or increased radio activity at significant times may alert enemy analysts permitting them to derive intelligence from this fact and collateral information. Therefore, no significant changes will be made in normal radio traffic pattern except as ordered by the Commander, Joint Task Force THREE.

(2) *Specific Actions*

(a) Radio circuits will not be established for the convenience of personnel but only for operational and administrative requirements.

(b) All messages transmitted over long range, high powered radio circuits will be encrypted. Exceptions to this rule will be permitted in following type of messages: American Red Cross, normal weather traffic, aircraft PX reports which do not reveal the classified mission, type of cargo or names of passengers and normal administrative matters not connected with Operation GREENHOUSE. Periodic reviews will be conducted by CJTF-3 to insure compliance with this.

(c) All radio transmissions will be held to the absolute minimum consistent with operational and administrative requirements.

(d) Signals in the clear which will indicate exact time of shots or other operational data will be restricted to low powered, short range, line of sight transmissions. Any exceptions must be approved by CJTF-3.

(e) Special coordinating signals will be transmitted by the ARPACAS which is a secure device and will transmit continuously effective 15 February 1951. Instructions will be issued to necessary holders.

(3) *Monitoring During Operation GREENHOUSE*

Commander, Joint Task Force THREE will establish a Security Monitoring Detachment under the J-5 Division, which will monitor all radio circuits to insure that the provisions of this document and general security regulations are followed. Commanders will be notified of discrepancies and corrective action will be taken.